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APPRAISAL OF THE APPLE INDUSTRY  
IN THE  
FOUR CORNERS REGION

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# Improving Apple Marketing in the Four Corners Region

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## APPRAISAL OF THE APPLE INDUSTRY IN THE FOUR CORNERS REGION

Summary: The Four Corners Region includes most of the states of Arizona, Colorado, New Mexico and Utah.

The Four Corners Region has produced about 2% of the annual U.S. commercial apple crop in recent years. Because a significant portion of the Region's production is sold ungraded in bulk, prices received by growers have averaged about 3¢/lb less than those received in competitive areas. Costs of production in the Four Corners Region are about the same as in other areas.

Many of the Region's apple orchards are too small to justify sophisticated production practices that would improve the quality of the crop. With low average quality, grading losses are too high to justify the handling that could bring higher prices. Neglect of small neighboring orchards makes protection of larger plantings from disease and pests more difficult.

Provided that sufficient quantities of good quality apples were produced, new facilities for grading, packing and storing apples may be justified in some areas of the Region. An appropriate packing facility handling about 4 tons/hr. probably would cost about \$400,000 and a controlled atmosphere store for 840 tons would cost about \$120,000.

Greater coordination and cooperation among growers is required to improve quality, obtain higher prices, and, possibly, build and operate new packing and storage facilities.

## Recommendations

1. New or replacement plantings should involve modern horticultural practices, especially the use of dwarfing rootstocks and spur type strains of popular varieties. Expansion of production should be avoided and the emphasis placed instead on quality improvement and production efficiency.
2. Cooperative efforts to promote proper and economical spraying and pruning should be encouraged. Where growers are too small to justify this investment in the necessary equipment, service should be available from specialized firms or growers' organizations.
3. Because neglected trees can endanger operating orchards by harboring pests and diseases, mechanisms should be strengthened for removing the hazard. This may require amendment of existing legislation to make proceedings impersonal and effective while avoiding excessive hardships to indigent owners.
4. Arizona is not yet a commercial producer, but there are large young plantings in the state. Some provision should be made for efficient marketing when production begins. Additional grading and packing facilities are needed in Montrose and Montezuma counties of Colorado. Some controlled atmosphere storage could be advantageously developed in Colorado. New Mexico does not need additional storage facilities because its growers primarily market early in the season and existing facilities for packing fruit are adequate. Utah could also use additional facilities for packing and controlled atmosphere storage.



5. Marketing efforts could be improved by: .

- (a) Concentrating promotion efforts in distribution areas where the industry can capitalize on state pride or exploit the economic advantage of proximity.
- (b) Coordinating and concentrating selling efforts to reduce price cutting among packers in each area.
- (c) Setting up telephone information centers to provide prevailing prices during the active part of the selling season.

## INTRODUCTION

### Objectives of this report

This study was sponsored by the Four Corners Regional Commission and carried out by the Agricultural Research Service and the Farmer Cooperative Service beginning in the summer of 1970. The objectives were to analyze the region's position in relation to other apple growing areas of the country; to describe and estimate costs of improved marketing facilities; and to recommend organizational changes that might improve apple marketing in the region.

Basic data for the study were collected in field trips by experts in marketing and farm organizations; representatives of the industry were interviewed and other local sources of information consulted.

Over the period of analysis and report preparation, some new information became available and conditions changed from those originally observed. In particular, a recent killing freeze in New Mexico drastically reduced that state's output and future potential. In some instances, this freeze could provide an opportunity to plant popular varieties in more efficiently planned orchards, or, perhaps, to convert these acreages to other uses. It is hoped that this report will be helpful to all segments of the Four Corners<sup>apple</sup> industry. It potentially may be helpful to small, independent growers whose needs include capacity to grow good quality apples and to improve their monthly production.

Necessarily, this report must make relatively general recommendations to allow for variations among conditions. More specific guidance, especially in organizations, variety selection, and local cultural practices are available from county, state and federal agencies.

### Apple Producing Areas of the Region

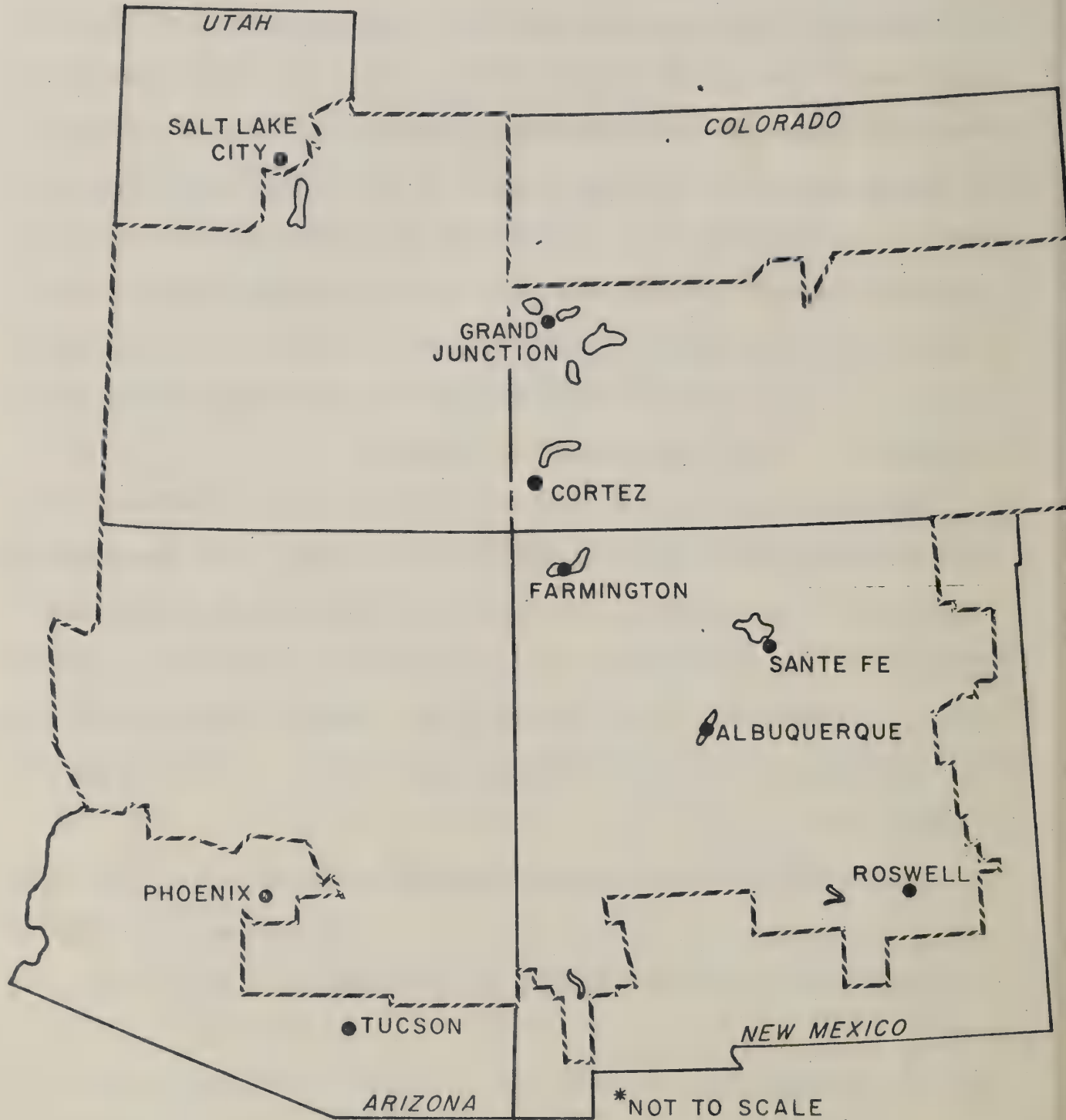
The Four Corners Economic Development Region includes 92 of the 137 counties of the only four states in the country sharing a common junction. Not included are five southern and southwestern counties of Arizona, 11 southern and eastern counties of New Mexico, 22 northern counties of Colorado, and eight northwestern counties of Utah. With the exception of a few orchards north of Salt Lake City, one or two small operations near Cloudcroft in New Mexico, and some isolated sections of Colorado, present commercial apple producing areas of each of the States lie within the boundaries of the Economic Development Region.

These areas are shown in Figure 1. None is shown for Arizona since it has no production of consequence at the present time. New large plantings ensure its entry into commercial production within the next few years. Colorado's principal center of production is in a Tri-County area (Mesa, Delta, and Montrose), on the Western Slope. Smaller operations are managed in Montezuma County in the southwest corner of the State with a few orchards in Eastern Slope counties.

New Mexico has several widely separated producing areas. They range from the San Juan and Animas River Valleys of the Northwest to the Hondo, Ruidoso, and Penasco River Valleys of the Southeast, a span of about 500

FIGURE 1:

# APPLE PRODUCING AREAS\* OF THE FOUR CORNERS ECONOMIC DEVELOPMENT REGION





miles from extreme ends. There are strips of orchards in the Rio Grande Valley north and south of Albuquerque, producing mostly for local sale. At the southeastern end of Rio Arriba County and the northern end of Santa Fe County are many small and several sizable orchards in a fairly concentrated area around Velarde, Espanola, and Chimayo. Isolated pockets of commercial production are found southwest of Santa Fe, in Canyon Canada near Pena Blanca and in the Mimbres River Valley in Grant County toward the southwestern corner of the State.

Practically all of Utah's commercial production is concentrated in Utah County. It is mainly on the bench land at the foot of the Wasatch Mountains and along their lower slopes. South of Utah Lake, the producing area spreads out into and across the valley. Beginning around Lehi, about 15 miles south of Salt Lake City, the overall area extends to Santaquin, some 60 miles from the capital.

## THE NATIONAL AND REGIONAL APPLE ECONOMY

### National Production and Price Trends

The 1960 U.S. commercial apple crop was slightly under five billion pounds. In ten crop years since that time, it has ranged between the 5.4 billion pounds of 1967 and the 6.8 billion pounds of 1969. Fresh sales were between 3.1 and 3.2 billion pounds in four seasons during the 1960's. They expanded only to 3.7 billion pounds out of the large 1969 crop. Processing has consumed from 37 to 45% of commercial production, with most recent years near 43%.

As noted in Table 1, total commercial crop figures do not include quantities not harvested nor excess cullage because of market conditions. In some regions, especially the East, some of the cull apples are processed.

The national average price to producers of apples sold fresh during the 1960-1970 period ranged from 5.16 cents per pound in 1963 to 8.10 cents per pound in 1968. The spread between these minimum and maximum prices was spanned in five successive annual increases. The large crop of 1969, however, resulted in an average producer price of 5.49 cents per pound, a one-third drop from the previous year, and only slightly above the level of six years before. Production sold fresh and for processing and the average price of fresh sales are shown in Figure 2.

### Regional Production and Price Trends

The size of commercial apple crops in the Four Corners states is shown in Table 2 and compared with those in other regions.

Economic losses out of crops produced for the fresh market have fallen most heavily upon the Four Corners' states. New Mexico had to abandon 10 to 15 percent of its crop in each of the years 1968-1970; it was unable to sell

almost 5 percent in 1971 after having its crop halved by the freeze.

Utah suffered a 20 percent loss in 1969; Colorado, 4 percent that year.

In contrast, Washington (only other Western state so affected) lost 1 percent out of its huge crop of 1969, and  $\frac{1}{2}$  percent in 1971.

The Four Corners Region is producing a declining fraction of the national crop, falling from 2.6% in 1968 to 1.8% in 1971. In fact, the total regional

TABLE 1.--U.S. commercial apple production, volume sold fresh, average price of fresh sales, and economic losses, 1960 - 1971

Crop year	Total <u>1/</u> production	Sold fresh	Average price <u>2/</u>	Economic losses <u>3/</u>
	<u>Million pounds</u>	<u>Million pounds</u>	<u>Cents per pound</u>	<u>Million pounds</u>
1960	4,912	3,105	6.09	5
1961	5,635	3,398	5.48	62
1962	5,685	3,369	5.68	4
1963	5,720	3,406	5.16	32
1964	6,240	3,529	5.35	79
1965	5,993	3,336	5.87	138
1966	5,646	3,178	6.04	111
1967	5,395	3,135	7.40	30
1968	5,442	3,155	8.10	22
1969	6,752	3,707	5.49	110
1970	6,294	3,567	6.46	138
1971	6,110	3,495	--	290

1/ Quantity sold or utilized, fresh plus processed.

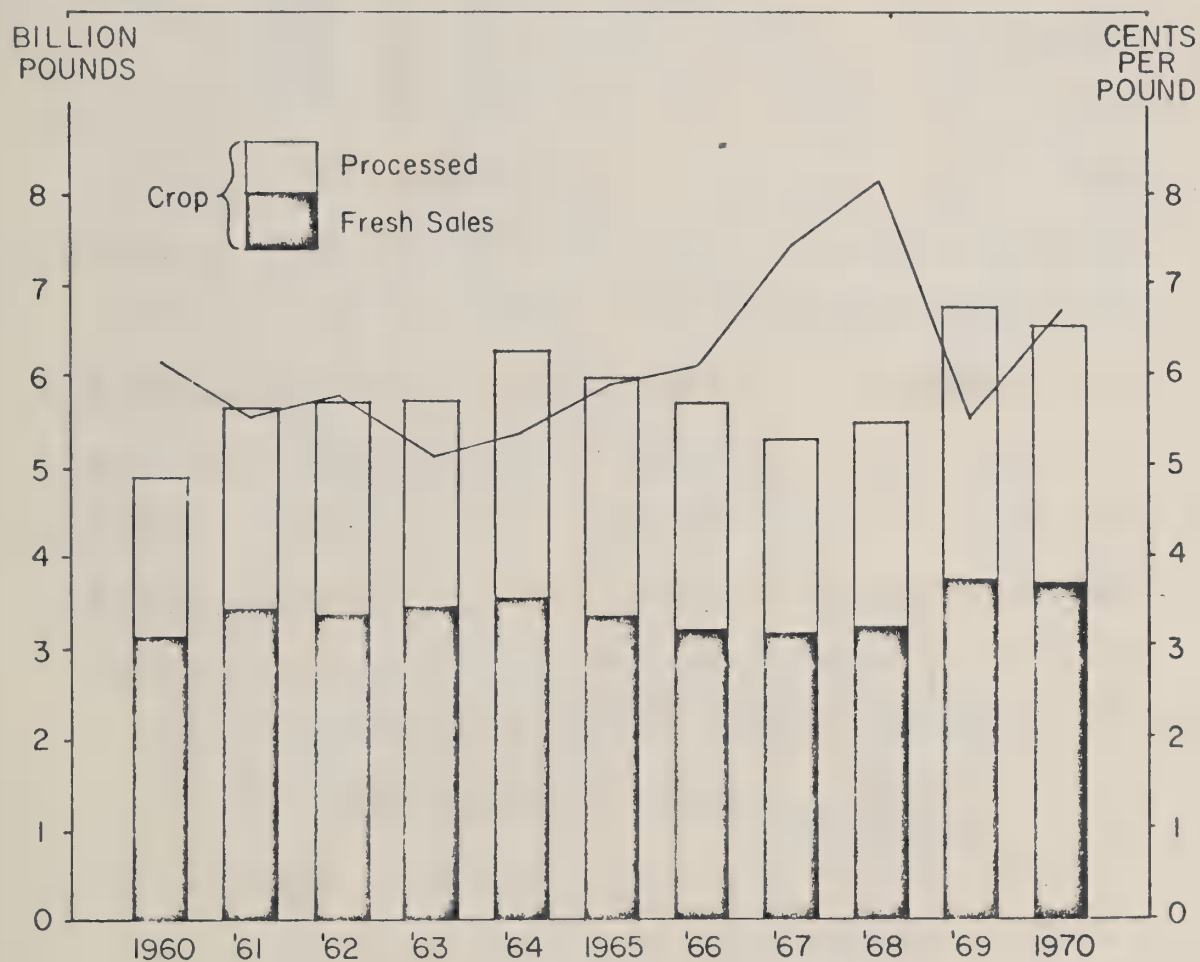
2/ Returns to producers at point of first sale weighted by quantities sold for fresh consumption in all states (except for Washington, Oregon, and California where returns are at packinghouse door).

3/ Quantities not harvested and excess cullage.

Source: Statistical Reporting Service, USDA



FIG.2 U.S. COMMERCIAL APPLE CROP\*, VOLUME SOLD FRESH,  
AND AVERAGE PRICE OF FRESH SALES  
1960-1970 Crop Years



\*Excluding economic losses

Source of Data: Statistical Reporting Service, USDA.

TABLE 2.--The Commercial apple crop of the Four Corners Region  
and other producing areas 1968 - 1971

<u>State or Area</u>	<u>Million Pounds Sold or Utilized</u>			
	<u>1971</u>	<u>1970</u>	<u>1969</u>	<u>1968</u>
Colorado	74	63	77	74
New Mexico	12	25.5	24.9	36.5
Utah	25	27.5	42	28
Total Four Corners	111	116	143.9	138.5
Other Western States	1815	2065	2516	1760
Total Western Area	1926	2181	2659.9	1898.5
Total Central Area	1270.7	1220	1273	1052.1
Total Eastern Area	2913.4	282.9	2818.9	2491.3
Total United States	6110.1	6293.9	6751.8	5441.9

Source: Crop Reporting Board, SRS, USDA.  
Commercial orchards defined as having 100 or more bearing trees. Not included are quantities not harvested and excess cullage, primarily from the Eastern area.

crop is less than recent national economic losses. The states of Washington, New York, Michigan, Pennsylvania, Virginia, and California each produce several times as many apples as the Four Corners Region.

Average prices received by producers of apples sold fresh in the Four Corners Region and other Western States for 1968-71 are shown in Table 3. The larger proportion of the Colorado crop sold in graded and packed form mainly accounts for its higher average price.

In the other Western states, prices are quoted at the packinghouse door instead of the point of first sale. The spread between the two prices may amount to 5 cents per pound. Making due allowance for differences in average grade and proportions graded and packed, it appears that Northwest apples command a premium of two to three and one-half cents per pound over 'Four Corners' fruit of comparable quality and size.

#### Per Capita Consumption - Trends and Outlook

In the quarter century since World War II, per capita consumption of apples in fresh form has declined from an annual average of more than 24 pounds to an average of less than 16 pounds. During the same period, per capita consumption in processed form increased from an annual average of 4 to 5 pounds (fresh equivalent weight) to an average of about 11 pounds. These opposite trends were virtually offsetting, so that combined per capita consumption remained fairly constant within the range of 24-28 pounds in 17 of the 25 years.

Consumption figures in each form are shown for individual years in Table 4. It will be noted here that, following calendar year 1969 fresh

TABLE 3.--Season average prices per pound received by growers for fresh sales of apples in Four Corners Region and U.S. 1968 - 1971

State and Region	1971	1970	1969	1968
----- Cents per pound -----				
Colorado <u>1</u> /-----	8.80	6.90	6.20	7.10
New Mexico <u>1</u> /-----	7.20	5.38	6.03	5.33
Utah <u>1</u> /-----	7.49	6.95	4.40	6.86
Four Corners' Region <u>2</u> /--	8.40	6.58	5.65	6.58
United States <u>2</u> /-----	6.98	6.52	5.44	8.10

1/ Returns at point of first sale.

2/ Weighted average.

Source: Statistical Reporting Service, USDA.



TABLE 4.--PER CAPITA CONSUMPTION OF APPLES  
In fresh and processed form: 1960-1971

Calendar years	Fresh	Processed <u>1/</u>	Total
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
1960	18.3	7.7	26.0
1961	16.4	7.9	24.3
1962	17.4	7.7	25.1
1963	16.7	8.6	25.3
1964	17.8	8.8	26.6
1965	16.3	9.3	25.6
1966	16.0	7.9	23.9
1967	16.2	9.1	25.3
1968	15.7	9.2	24.9
1969	15.1	10.7	25.8
1970	18.5	11.3	29.8
1971 <u>2/</u>	16.2	11.8	28.0

1/ Fresh equivalent of the quantities canned, frozen, and dried.

2/ Preliminary.

Source: Economic Research Service, USDA.

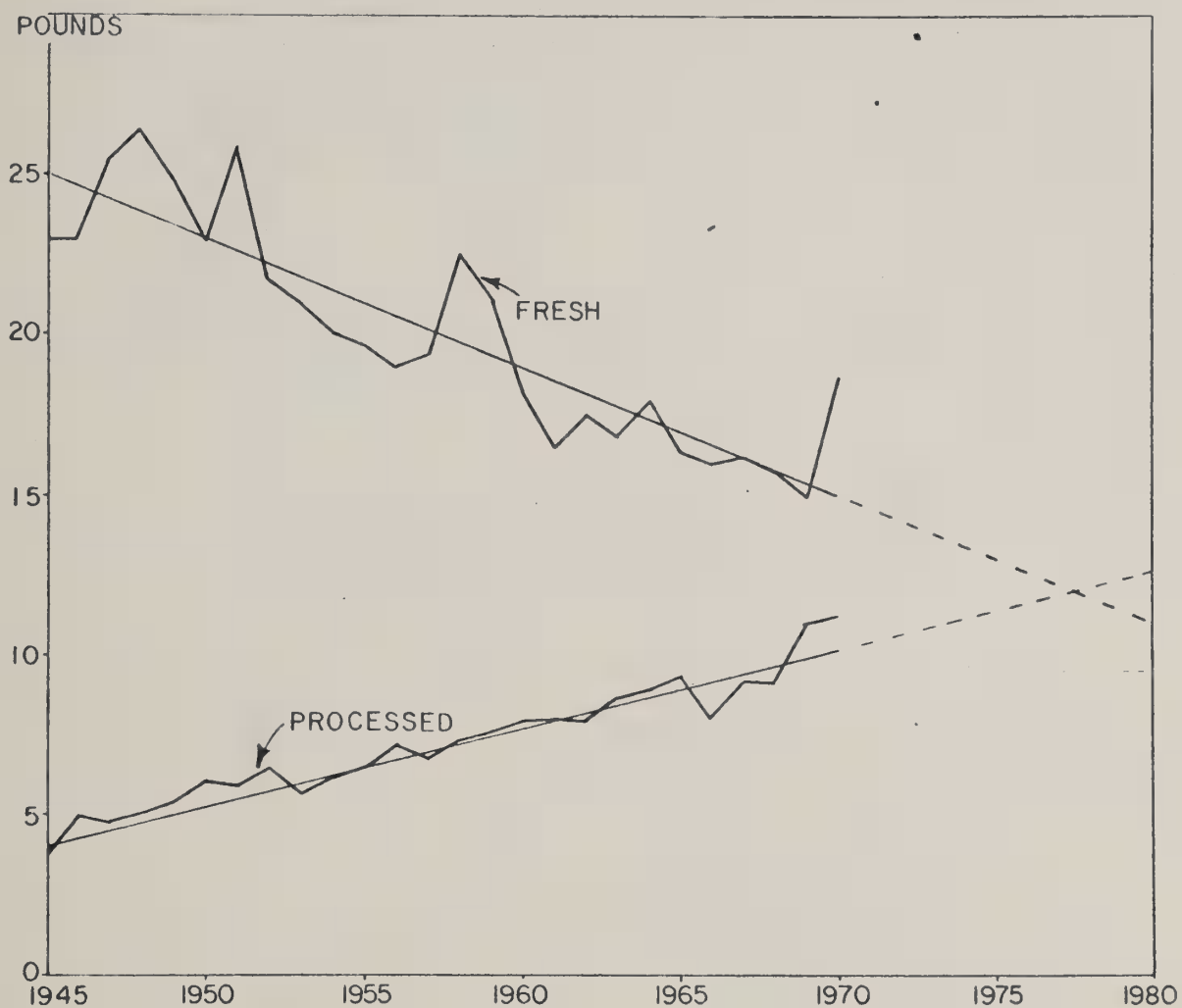
consumption surged to 18.5 pounds per person. Some of this can be attributed, of course, to post-January 1 consumption of the large crop of 1969, and the depressing effect upon price of that heavy supply. Since the percentage rise, however, is more than double the proportionate increase in supply, it holds hope for the industry that the long-endured decline in per capita consumption may have been arrested. The preliminary data for 1971 support this hope.

The contrasting trends in per capita consumption of fresh and processed apples are graphically depicted in Figure 3. Concerning these trends, the Long-run Projections Section of the Economic Research Service, USDA, furnished the following assessment.

"We expect per capita consumption of apples in all forms to be about stable or perhaps to rise slightly over the next few years. Fresh consumption is likely to decline on a per capita basis, but the rate of decline will probably be less than in the past two decades. One reason is that the impact of urbanization and production changes are largely completed. In addition rising incomes will tend to hold up the demand for fresh apples. Processed uses may rise somewhat further, but the rate of increase will probably be slower than in the past."

An earlier analysis by the Economic Research Service predicted that a change in per capita apple consumption could only be achieved by a change in price due to competition from increasing supplies of oranges and other fruits. Because apples have a retail price elasticity of about 0.5, a 10%

FIG.3 PER CAPITA CONSUMPTION OF FRESH AND PROCESSED APPLES  
IN THE QUARTER CENTURY 1945-1970



Source of Data: Economic Research Service, USDA.

increase in consumption would require a 20% decrease in retail price. The decrease in farm prices would be still greater because farm-retail margins are expected to increase.

Since this appraisal relates to total apple consumption, and processed product prices are less likely to be lowered than fresh apple prices, the impact at the grower level on the latter would have to be doubly severe in order to effect even this small increment in per capita consumption. The reference to further substantial increases in supplies of competing fruits is especially significant in the light of the price relationships in recent years discussed below.

Table 5 shows that retail prices of fresh apples in recent years have averaged more than 50 percent higher than the average level prevailing a decade earlier. By contrast, average prices to growers were about 10 percent higher.

#### National and Regional Production Potentials

All indications point to increasingly large crops of apples for fresh sale throughout the country during the next five years. Almost without exception, the productive potential of major growing areas has been expanded by heavy plantings in the mid-1960's. Most such new and replacement plantings were set by already large and efficient producers who can be expected to maximize the yield of packable fruit from their orchards. Development of newly-irrigated tracts in the Northwest and extension or expansion of producing areas in the Southeast and elsewhere will contribute to the prospective heavy supply situation in the near

TABLE 5.--FARM AND RETAIL PRICE INDEX OF APPLES;  
Retail index of bananas and oranges  
1957-59 = 100

Year	Farm	Retail		
	Apples	Apples	Bananas	Oranges
1960	137.2	108.3	92.3	111.8
1961	123.4	116.0	92.2	116.9
1962	127.9	109.6	95.0	120.1
1963	116.2	115.9	95.7	137.3
1964	120.5	116.8	97.3	134.2
1965	132.2	119.7	95.3	118.4
1966	136.0	133.7	93.2	120.6
1967	166.7	140.3	94.1	116.9
1968	182.4	163.4	93.0	147.6
1969	122.5	162.5	95.3	128.4
1970	146.8	150.0	95.5	133.5
1971	157.2	160.2	89.8	146.8

Source: Farm index computed from Statistical Reporting Service prices; retail index, Economic Research Service, U.S. Department of Agriculture.



future. With average exports almost cut in half during the last five years while imports have practically doubled, this much additional volume is additive to what could evolve into a serious economic surplus.

Most new trees set in the last several years are of dwarf or semi-dwarf type. These trees reach bearing age and maximum yield earlier than trees on standard rootstocks. Consequently, the national production potential will be augmented and accelerated by the cumulative effect of these more recent plantings attaining full bearing simultaneously with standard trees set in preceding years. This situation is particularly true of the Four-Corners Region where, for example, 60% of new plantings in Colorado are dwarf and semi-dwarf type.

Washington presently has the potential for an apple crop half again as large as the average of that produced and sold fresh in the State in the last four years. Barring extensive winter injury to trees, such as the set-back in 1968, production of this magnitude could be realized by 1975. Owing again to the high percentage of dwarf-type trees approaching maximum productivity by that time, coupled with the fact that these trees were mainly set and are being cultivated by the more efficient producers, the proportion of top-grade fruit packed out from this potential crop can be expected to exceed that of previous years. It is understood that both Oregon and Idaho likewise face sizable increases in production from the potential bearing surface of their present apple plantings.

In the Four Corners Region, a substantial net gain in the aggregate commercial crop is also in prospect. Potentially, Colorado may produce a one-third larger crop in one of the next four or five seasons. Utah could grow one-fourth more. New Mexico growers had set enough new trees in the late 1960's to expand its commercial production by at least 25 percent by the mid-1970's; the severe winter kill in January 1971, however, will result in a smaller crop for at least the next several years. Arizona will emerge as a commercial producer of apples within two or three seasons.

Arizona will become a commercial apple producing state within the next three or four years. Heretofore, its production has been limited to the volumes grown and sold locally, such as the small crops in Oak Creek Canyon south of Flagstaff and the Sulphur Springs Valley north of Douglas. In both 1970 and in 1971, however, 17,000 trees were set near Pearce in Cochise County, about 80 miles east and a little south of Tucson. Additions to this one operation have been made resulting in almost 60,000 trees in a single block. If the water supply and climate permit, the new area may produce one million boxes in good years which will compete for early-season markets with established Four Corners' areas.

In summary, it appears that the Four Corners' States could have a combined production potential of approximately 220 to 244 million pounds by the late 1970s. This assumes that New Mexico will recover from its freeze damage at least to the level of recent years and no similar disasters are suffered there or elsewhere in the Region.

TABLE 6.--Apple trees of bearing and non-bearing age for  
Four Corners Region

State	Number farms	Total trees	Non-bearing	Bearing	Apples harvested (million lbs)
Arizona					
1969	52	15,032	2,301	12,731	.40
1964	138	14,481	5,378	9,103	.89
Colorado					
1969	355	504,322	114,414	389,908	62.83
1964	655	472,115	149,906	322,209	67.68
1967 <u>1/</u>		591,999	206,160	385,839	
New Mexico					
1969	264	189,745	33,405	156,340	13
1964	493	175,578	38,238	137,340	22.90
1969 <u>2/</u>	841	297,000			
Utah					
1969	291	207,581	56,252	151,329	22.58
1964	515	170,276	51,068	119,208	19.04
1971 <u>3/</u>	224	178,287			

Sources: 1969 Census of Agriculture, Department of Commerce except:  
1/ Colorado Fruit Tree Survey, 1967, USDA and Colorado Department  
of Agriculture.  
2/ New Mexico Apples, New Mexico Department of Agriculture and  
USDA, 1969.  
3/ Utah State Department of Agriculture 1971.

## APPLE PRODUCTION AND MARKETING COSTS

Primary present concern of the apple industry is the substantial increase in costs of production and marketing in recent years. With their own prices not keeping pace with rising costs, unit net returns have been reduced for all producers. The cost-price squeeze provides the economic incentive for increased production per acre in the face of already excessive prospective total supplies.

### Production costs

Current levels of certain components of the Index of Prices Paid by Farmers as compared with the figures of five years before indicate the magnitude and seriousness of cost escalation. Significant elements of the production subgroup are those costs borne by fruit growers listed below:

<u>Component</u>	<u>% increase 1972 over 1967</u>
Interest <u>1/</u>	49
Taxes <u>2/</u>	55
Wage rates	44
Machinery	34
Auto, truck, tractor	27
Motor supplies	14
Farm supplies	15

1/ Paid on debt per acre;

2/ Payable per acre;

The combined average increase in these costs (plus fertilizer, which increased 3%), weighted in the proportions assigned in the official index, was right at 30 percent over the five-year period. While taxes and interest

showed the largest increases (in dollar amounts per acre, as noted; not simply in rate rises), they also had the lowest weights and thus the least-multiplied effect in the average. Motor supplies carries the heaviest weight among these components in the general index with wage rates second most important. For fruit growers, however, wages may be the dominant costs.

Washington State University published its latest production-cost study in July, 1971, based upon 1970 data (1)\*. It shows that the constructive cost of producing and harvesting apples in Okanogan County in 1970 was \$1,134 per acre. The study was predicated upon these assumptions:

1. An orchard north of Brewster with 30 acres in apples;
2. Standard trees planted 108 to the acre; (20' x 20');;
3. 75% bearing trees; 25% interplanted replacements not yet bearing;
4. Red Delicious and Golden Delicious varieties in 3 to 1 ratio;
5. Irrigated by a portable sprinkler system;
6. Orchard heating costs not included;
7. Labor rates: Hourly work @ \$2.00; piece work at 1970 rates;
8. Supervision: 5 percent of cash operating costs;
9. Yield: 734 field boxes (33-lbs.) per acre; (12.1 tons).

On the yield assumed, cost per field box was \$1.54; cost per ton: \$93.62.

A combined figure of \$2,500 was used as the capital investment per acre in land, trees, and the irrigation system. Since the components were not stated separately, establishment cost can only be estimated on the basis of the figures which follow. Unlike previous Washington studies, this analysis was synthesized rather than based upon an average of farm cost accounts.

A definitive series of studies was completed in Washington in 1967 on the comparative costs of establishing productive apple orchards on different

\*Numbers in parenthesis refer to notes at end of chapter.

rootstocks (2). The cumulative investment over the respective nonbearing periods for trees on standard, semi-dwarfing, and full-dwarfing rootstocks was determined with these results:

<u>Rootstock</u>	<u>Trees Per Acre</u>	<u>Nonbearing years</u>	<u>Cumulative Investment</u>
Standard	108	7	1,899
Semi-dwarfing	268	5	1,711
Full-dwarfing	400	3	1,455

In each instance, some net return value was attributed to the small initial crops in the last year of the theoretical nonbearing periods and credited against accumulated establishment costs.

Presumably, the required investment today would be about fifteen percent more for each, or \$1,673 to \$2,185 per acre.

An Oregon analysis of apple production costs in 1969 was done for Diamond Fruit Growers, Inc., by Mr. J. E. Klahre, former longtime manager of that cooperative, serving in an advisory and consulting capacity (3). Based upon the records of 54 growers, it determined that the average cost of production in that year was \$1,185 per acre. This included a charge of \$91.50 per acre for management predicated upon a flat fee of \$20.00 per acre and \$5.00 per ton of fruit produced. Average yield basis was 14.3 tons per acre of loose fruit delivered to warehouse. Variable costs were: Growing - \$51.2 per acre; harvesting - \$25.4 per acre. The latter represented 35.5¢ per 40-pound lug on the basis of the average yield. Fixed costs were \$327 per acre. Assuming a packout ratio in the range of 70-85 percent, the average production cost was the equivalent of about \$2.05 to \$2.50 on a 42-pound packed box.



In Michigan, a total production cost of \$623 per acre was found for apples in the principal fruit area of the State in 1970 (4). This was based upon a 9.6 tons per acre orchard yield. Component costs were: Growing - \$228; harvesting - \$243; fixed - \$152. Combined production cost was \$1.36 per 42 lb. box before packing or \$1.60 - \$1.94 per packed box. No management charge was included. The author analysts stressed that the costs reported were not averages, since higher than average yields were assumed. Basic data were not taken from farm records but "obtained through small group discussions" with an unstated number of growers.

A New York analysis of 13 apple operations in 1969 ranging in size from four to 303 bearing acres reported an average production cost of \$550 per acre (5). This included \$90 per acre for storing and selling. (Subtotals are not comparable to the other studies since fixed and variable costs were combined.) Average yield was 7.8 tons of packable fruit, apparently about the same as the 9.6 tons of orchard run in the Michigan study. Cost per 42 lb. box was \$1.48, while returns averaged only \$1.22. Although no management charge was assessed, only three of the operations realized any net return over costs. They ranked 2d, 4th, and 13th in size. Authors stated that the operations "are generally well-run, full-time, commercial farm businesses . . . . representative of 'better' farmers of New York."

A Pennsylvania study of some years ago (6) was recently updated to reflect 1969 cost levels (7). It was based upon 18 orchard operations

producing fruit primarily for processing. Size varied from 30 to more than 400 acres, averaging 119. Data were actual costs taken off farm accounts. Management cost was included only as reflected in value of family labor. Original finding as the average of all operations over a five-year (1959-63) period was \$332 per acre. Adjusted to 1969, it was \$433 per acre. Average yield was 7.8 tons per acre orchard-run. The range of average costs in the basis years was \$302 to \$356 per acre; mainly reflecting variation in harvesting costs in the different seasons stemming from the fluctuation in average yields from 5.2 to 9.3 tons per acre.

An analysis of the cost of producing Gravenstein apples for processing was made in 1970 by California Apple Growers Association in cooperation with the University of California Extension Service (8). Based upon a hypothetical orchard of 80 acres and a yield of 15 tons per acre, it found a total cost (not including management) of about \$1,100 per acre or \$73 per ton. Labor costs were assumed at \$2.20 and \$2.70 per hour including fringe benefits. Establishment cost was fixed at \$1,800 per acre. It was depreciated over 30 years, however, instead of the 20 normally used for fresh market and dual-purpose varieties.

A recent study of New Mexico State University, done in connection with the Navajo Indian Irrigation Project planning for the Four Corners Regional Commission (9), synthesized theoretical costs of apple production upon a 200-acre planting at approximately \$863 per acre. Yield was apparently

assumed to be at least 20 tons per acre orchard run. Major components of the overall cost estimate: preharvest (including irrigation and frost protection) - \$320; harvest - \$400 (\$19.83 per ton); supervision and management - \$143 (5% of gross returns).

The records of one apple grower within the Four Corners Region show these production costs for five successive recent seasons:

<u>Year</u>	<u>Total costs per acre</u>	<u>Yield per acre</u>	<u>Costs per ton</u>
	<u>Dollars</u>	<u>Tons</u>	<u>Dollars</u>
1965	591	11.0	54
1966	896	11.7	77
1967	401	9.4	43
1968	762	17.7	43
1969	952	20.8	46

Heating costs amounting to \$41 to \$86 per acre are included in the above results. However, they do not include depreciation of the orchard investment; nor was there any charge for management or supervision.

Comparison of the foregoing cost determinations in the several producing areas is not strictly valid, owing to initial differences in land values and labor rates, methods of analysis and other reasons. Subject to these limitations and qualifications, they are summarized in Table 7. Adjustments designed to place the data on as nearly comparable basis as possible were made and are noted in the table.

In none of the cost studies summarized above was the expense of orchard protection against frost and freeze damage taken into account. This may be because experience in such endeavors to date has been so limited and highly

TABLE 7.--Costs of producing and harvesting apples in certain  
growing areas 1970

Growing area	Costs (a) per acre	Costs per ton	Yield per acre	Sources
	<u>Dollars</u>	<u>Dollars</u>	<u>Tons</u>	<u>Notes</u>
Washington: Okanogan	1,101	91	12.1	(1)
Oregon: Hood River	1,137	80	14.3	(3)
Michigan: Southwest	623	65	9.6	(4)
New York: State	479	47	10.3	(5)
Pennsylvania: Adams & Franklin	450	58	(b) 7.8	(6) & (7)
California: Sonoma County	1,099	73	(b) 15.0	(8)
New Mexico	863	43	20.0	(9)
Four Corners Region grower	990	47	20.8	personal communication

(a) Adjusted from the amounts found in the respective studies for the following:

1. Supervision charges deducted from Washington and Oregon to be comparable with the other four;
2. Inflation: 1969 figures, on which Oregon, New York, Pennsylvania, and Four Corners studies based, inflated 4% to base all on 1970;
3. Yield basis: New York "packable fruit" yield figure increased one-third to approximate orchard run yield basis of the other five;
4. Other: Storing and selling costs removed from New York total.

(b) Produced and harvested for processing.

variable as to make findings upon the subject somewhat speculative.

Nevertheless, from the sizable capital investment involved, plus annual labor and fuel requirements, orchard heating expense in some areas may well add \$50 to \$150 per acre per year to the costs of production previously considered.

#### Effect of Yield

Unit production costs vary greatly, of course, depending upon yield. The Washington study points this up by computing itemized estimates both upward and downward from the assumed level of 12.1 tons a yield range from 6.6 to 26.4 tons per acre (1). Resulting range of overall costs was \$148 to \$58 per ton, respectively. The findings showed that a 300 percent increased yield throughout that range is associated with an increase of only 26 percent in total costs per acre exclusive of direct harvest operations. In this study, unit cost of harvesting was assumed to be constant throughout the range of yield. Some inverse relationship in this cost also is probable, however.

Table 8 shows the unit cost of producing and harvesting apples for operations in a range of yield from five to 20 tons per acre. As noted, these are based upon the Washington study of 1970 total costs per acre.

Knowledgeable apple growers are well aware, of course, that even though costs of production have been escalating rapidly in recent years, they cannot afford to economize at the expense of quality, size, or condition of the fruit.

TABLE 8.-- Variation in unit costs of producing and harvesting apples through a range of yield, Okanogan County, Washington, 1970

Yield Tons/Acre	Cost \$/Ton
5	186
6	160
7	141
8	127
9	116
10	107
11	100
12	94
13	89
14	85
15	81
16	78
17	75
18	72
19	70
20	68

Source: Computed and converted from Table 3, page 9 of Apple Production Costs for the Okanogan County Area of Washington, EM 3484, July 1971; Washington State University and Cooperative Extension Service.



Thus, while yield is the most important factor in unit costs, the percentage packout ratio in top grade and medium to large size is the final determinant of total net return to the producer.

#### Storing, packing and selling costs

The average cost of storing, packing and selling apples in Washington was apparently about six cents per pound during the 1970 crop season. This finding is based upon the spread between average f.o.b. sales prices and equivalent packinghouse door returns as officially reported (10).

There has been rapid escalation of these costs in the last three seasons. As shown below, the spread remained almost constant in the early 1960s at around four cents per pound then began inching upward for four years through the season of 1967. In 1968 it jumped 25 percent to more than five cents per pound, and has continued to rise to nearly six cents per pound in 1970.

<u>Crop</u> <u>Year</u>	<u>Cost Spread</u> <u>Pound : Box (42 lb.)</u>		<u>Crop</u> <u>Year</u>	<u>Cost Spread</u> <u>Pound : Box (42 lb.)</u>	
	-----	cents -----		-----	cents -----
1961	4.15	174	1966	4.29	180
1962	4.15	174	1967	4.34	182
1963	4.15	174	1968	5.45	229
1964	4.25	178	1969	5.57	234
1965	4.26	179	1970	5.74	241

Two and three percent increases followed in the last two seasons. While inflationary forces, mainly labor costs, have been responsible for most of these increases, some part may be attributed to improved and extended services received, mainly longer holding of the fruit under controlled

atmosphere storage. Also, the record-high average prices of 1968 enlarged the base upon which selling charges are computed.

Combined average costs for storing, packing and selling, the Four Corners producing States vary with the respective types of pack:

	<u>Cost per 42 lb. box</u>
In trays -	\$1.80 to \$2.00
In bags -	1.70 to 1.85
Bulk -	1.50 to 1.65

As in the case of Washington, assessments for promotion, where applicable, were included in these figures.

An economic-engineering study of apple storage and packing costs in Washington (12) identified three components: overhead, labor, and materials. In 1969-70, the plants surveyed averaged \$.81 per box for overhead (mainly the cost of buildings and equipment). Charges of 8% on equity capital and 7% on borrowed capital are included. Labor costs are sensitive to the variety (Red Delicious requires less care in packing than Golden Delicious), quality, type of pack, and balance between graders and packers on the line. Total work time for each packed box averages about 7 minutes for Red Delicious and about 11 minutes for Golden Delicious, varying somewhat with the other factors. At \$2.00 per hour, the labor component contributes from \$0.23 to \$0.37 per box. Costs of packaging material depend on the type of pack and the size of apples. The range for 1970-71 was \$0.43 (bags) to \$0.99 for small Golden Delicious fully wrapped in true cells. Under specific assumptions, and including some additional charges, the report synthesizes storing and packing costs of \$2.03 for a box of Red Delicious and \$2.45 for a box of Golden. To this should be added general management salary, selling costs, and voluntary fees to growers associations.

### Summary of Costs

It is difficult to define precisely all the costs involved in growing and marketing any agricultural commodity because of the differences among regions, varieties and individual producers. However, the range of values estimated here for apples are probably representative of likely conditions in the Four Corners Region.

<u>Category</u>	<u>Range of Cost per ton</u>
Producing and Harvesting	\$ 43 - \$ 80
Orchard Protection	2 - 8
Storing	11 - 36
Grading, Packing, Selling	71 - 112
Totals	<hr/> \$127 - \$236

Grower returns typically have been from about \$100 to \$160 per ton for fresh apples and from \$30 to \$70 per ton for apples going to processors. These figures illustrate the general contention of this report, and the common opinion of people in the industry, that growers receive prices only marginally higher than their costs, and, in the case of apples for processing, prices are lower than apparent costs. (It should be realized that many apples sold for processing are grade-outs from fresh market packs. Thus a return for them helps reduce the cost of grading and packing. In some areas, apples are grown under contract for processing; the profits appear rather low for that business recently.)

#### Appraisal of Cost Outlook

It appears that the costs of producing, harvesting, storing, packing, and selling apples will continue to increase at perhaps somewhat slower rates for the next few years. Almost without exception, each of the elements making up the composite of costs for these operations seems subject to further inflation. The impact upon the industry of certain increases may not be uniform. For example, with enactment of the new minimum wage levels, farm and packinghouse labor costs in those producing areas where going rates already exceed the new levels will not be directly affected. Other areas face increases that may be quite substantial. Whether or not existing differentials will be reestablished after a lapse of time depends upon factors not readily foreseeable, principally related, in all probability, to the general condition of the local economy.

The expected continuing uptrend in costs will give further impetus and incentive to original and replacement plantings of size-controlling rootstocks. Not only will this reduce total orchard investment and consequent annual depreciation cost, but also it will result in lower thinning and picking costs per unit of production, thereby helping to offset increases in wage rates.

Orchard and crop protection costs are likely to increase and be much more widely incurred in the near future. More and more growers will install solid-set, dual-purpose heating and irrigating equipment. With the ever-increasing sizable amounts which growers must commit to the making of a crop each year, the additional cost of providing some protection against the hazards of drought and/or frost damage would appear to be prudent insurance.

Costs of storing and packing fruit will probably increase by the aggregate amount of increases in labor, materials, utilities, and other components. With no further major breakthroughs in mechanization and automation in sight, there is little prospect for offsetting these rising costs with gains in productivity. Research and development in automatic tray packing holds out some promise that has so far not been realized. Owing to the rapid rise in building and manufacturing costs, new plant and equipment involves a 20 to 30 percent larger investment today than was necessary five or six years ago for comparable construction and capacity. Replacement costs of existing facilities in coming years may be half again as much as is being generated by current fixed charges for depreciation.

Notes - Production and Marketing Costs

- (1) Apple Production Costs for the Okanogan County Area of Washington, Samuel M. Doran and John M. Lange, E. M. 3484, Washington State University and Cooperative Extension Service.
- (2) The Cost of Establishing an Apple Orchard on Standard (Semi-Dwarfing, Full-Dwarfing) Rootstock, Columbia Basin, Washington, S. M. Doran and R. E. Hunter, E. M. 2832 (2833, 2834), Washington State University and Cooperative Extension Service.
- (3) A Study of Fruit Production Costs and Margins in the Hood River Valley, Oregon, 1965-69 Private research project by J. E. Klahre, Commissioned by Diamond Fruit Growers.
- (4) Economics of Apple Production in Southwestern Michigan, Feb. 1971; Agricultural Economics Report No. 184; Myron Kelsey, Stephen Harsh, and Harvey Belter, Michigan State University
- (5) Cash Crops and Fruits, Costs and Returns, from Farm Cost Accounts, December, 1970. C. D. Kearl and Darwin P. Snyder, AE Res. 325, Cornell University.
- (6) Factors related to the cost of Producing Apples in Pennsylvania, 1959-1963, B. Wayne Kelly, Farm Management 18, Pennsylvania State University.
- (7) The Golden Delicious Apple in Pennsylvania, B. Wayne Kelly et al, Circular 547, Pennsylvania State University.
- (8) Sample Costs to Produce Gravenstein Apples for Processing in Sonoma County, 1970, Herbert F. Dalton, Manager, California Apple Growers Association.
- (9) Cost, Return and Investment Budgets for Selected Crop Enterprises for Corporate-Structured Farms in Northwestern New Mexico; Agric. Exp. Station Res. Rep. 199, Department of Agricultural Economics and Agricultural Business New Mexico State University, April 1971.
- (10) Washington Agricultural Statistics: Fruit Crops 1970, Statistical Reporting Service, USDA; Washington State Department of Agriculture cooperating, September 1971.
- (11) Economics and Apples, (preliminary) Robert N. Bohall, Economic Research Service, U.S. Department of Agriculture 1972.
- (12) Apple Packing Costs - Washington 1971 (preliminary) W. Smith Greig and A. Desmond O'Rourke, Washington State University 1972.



## FACILITIES INVENTORY AND EVALUATION

There is great diversity among the facilities used by apple producers in the Four Corners States for sorting and packing their fruit for market. These range from simple machines under sheds capable of eliminating under-size and providing a flow of fruit past one or two sorters who cull out apples with prominent defects, making no attempt to "grade" to recognized standards, to sophisticated equipment layouts in finished buildings with capability for packing out two grades simultaneously, each broken down into the full range of commercial sizes. For purposes of inventory, however, the packing facilities in the Region will be classified in three groups:

1. Those capable of putting up a quality pack in several sizes and in substantial volume;
2. those with more limited capability in regard to sizing and capacity; and
3. facilities used only to eliminate undersize and the more obviously defective fruit, with low capacity, and only one or two size separations, if any.

### Colorado

Colorado has nine or ten facilities that can be classified as capable of putting up first quality packs of apples in a representative range of sizes and in substantial volume. Aggregate average output of these facilities (as distinguished from combined capacity ratings of their equipment) is about 52.5 tons per hour. Eight or nine smaller facilities with more limited sizing

capability pack well-graded fruit at a combined average rate of about 21 tons per hour. Nine packinghouses have waxing equipment in their lines. Some undersize elimination, sorting, and broad-range-sizing is done in other facilities throughout the State, mostly employing elementary equipment and manual handling. The great bulk of the Colorado crop is custom packed in the larger houses for the account of members, stockholders, and non-affiliated producers.

There is storage capacity for more than 10,500 tons of apples in bulk bins in Colorado. An additional 1,680 tons of capacity was being constructed in 1971 and a 1,050 ton storage is planned for 1972. Most of the existing facilities are relatively new and efficient. Some older capacity is hard to hold at proper temperature or is otherwise uneconomic by reason of low ceilings, obstructing columns, or access problems. Combined refrigerated holding capacity for packed fruit among the smaller facilities is probably about 630 tons.

The operations of some of the smaller producers in the State, particularly in Montrose and in Montezuma Counties, have outgrown their very limited packing facilities, in some cases, only simple hand-sizing systems. If hauling to one of the large custom packing facilities is not practicable, they may find it feasible to combine resources in a new packinghouse facility suitably located for common use. One fairly sizable operation in Montezuma County will probably find it necessary to expand and modernize in the near future. It well might spearhead the development of centralized packing facilities in that area.

Up to the present time, no apples have been stored under controlled atmosphere in Colorado. Development of some CA capacity would appear to be feasible and desirable, however, for these reasons:

- (1) It would extend and maintain contacts with accounts regularly supplied throughout the marketing season;
- (2) it would help to spread the impact of the heavy supplies in prospect;
- (3) it would reduce unit cost of the packing operation to the extent greater utilization is made of plant and equipment;
- (4) on the basis of experience in other areas to date, it appears that net return on fruit packed out of CA storage more than compensates for the additional cost.

#### New Mexico

New Mexico has six or seven fairly efficient packing operations putting up a good grade of apples in a range of sizes. Three or four of these could be classified as modernly mechanized. Two had waxing equipment in the lines for the 1970 season. Average total hourly output of these houses is probably in the range of 25 to 32 tons. Not included in this inventory is a facility with some of the latest and most efficient equipment, having a packing capability of up to 6.3 tons per hour, which has not been operated during either of the last two seasons. It belongs to a cooperative whose members say that they found it impracticable to pack to commercially acceptable standards because the quality of their production necessitated excessive grade out. They concluded that they could realize a greater net return from the sale of orchard run or hand-sorted fruit to truckers.

Five or six smaller facilities pack carefully graded apples in a limited number of sizes. None of these can handle fruit in bulk bins. Their aggregate average output is about 10.5 to 12.5 tons per hour. There are 15 to 20 other establishments throughout the state which make some use of equipment for sorting apples. For the most part, these are minimally mechanized, the resultant output is usually not "packed" in new cartons, nor sorted to a recognized grade. As in the case of the cooperative mentioned above, most of these operators maintain that they can net more with these marketing methods than they could attempting to pack for the "quality" trade.

New Mexico has only two storages primarily designed for handling loose fruit. Their combined capacity is about 2,500 tons. The other graded operations have refrigerated holding rooms with capacities from a few hundred to ten thousand packed boxes (10 to 200 tons). No controlled atmosphere storage has been built in the State.

As long as those New Mexico producers who have an early-season selling advantage over the apple growers of other states can continue to move all or the bulk of their crop to market with minimum competition, it seems advisable for them to continue to do so rather than to store apples for later sale. This obviates the need for additional facility investment. An exception to this policy is indicated for producers with assured outlets within the state or in some nearby areas where a freight-rate or other marketing advantage will enable them to compete successfully throughout a storage season. While some packing facilities of quality producers are

obsolete, no blanket evaluation of them as therefore uneconomic or inefficient can be made, especially when replacement costs may be very high. Whether or not it would be advisable for them to invest in new plant and/or equipment facilities could be determined only through an economic-engineering analysis of particular, individual operations.

#### Utah

There are six or seven first-line apple packinghouses in Utah. Their combined average output is about 31 tons per hour. All but one have waxing equipment in the line. Seven or eight other houses put up a good grade of fruit in limited sizes. Most of these are well mechanized, receiving and dumping the fruit from bulk bins.

Throughout that part of the State within the Regional area, there are 13 to 15 additional facilities which are used for some sorting and sizing of apples. A few of these are down near St. George, in Washington County, in the southwestern corner of the State; one is at Moab in Grand County.

Total storage capacity in Utah exceeds 8,400 tons. About 65 percent of these facilities are suitable for handling loose fruit in bulk bins. There is one controlled atmosphere storage in the area with capacity for 420 tons. Another is under construction for use with the 1971 crop; it will hold approximately 840 tons.

Additional packing facilities are required in Utah to handle its increasing production. Some growers who have been hauling fruit to neighboring houses for custom packing must invest in new plant and equipment, not only to take care of their own expansion, but also because the facilities

they have been using may be fully committed in coming seasons to the handling of fruit with prior claim to the capacity. Supporting loose-fruit storage facilities will likewise be needed. Continued progress in the successful promotion of Utah fruit in the home-state market should also make it feasible for certain producers to put in some limited CA storage to extend the supplying of these accounts over an 8 to 10 month season.

### Processing Facilities

An apple cannery is located at Delta, Colorado. It is the only full-line processing facility for apples between Michigan and California. In the 1969-70 season which had a very heavy crop, approximately 21,000 tons were handled through this plant. It is owned and operated by a corporation in which leading growers of the area are the principal shareowners. While these growers have priority over other producers in the event of excess supplies, ordinarily the plant stands ready to buy from any grower who delivers acceptable raw stock, paying in accordance with the quality of the fruit. Some growers in northern New Mexico have hauled grade-outs to Delta for sale to this plant in recent seasons. Net return for them, however, is only marginal because of the high transport cost.

Two juice plants are in the Utah producing area. One has operated for many years near Crem. A new plant southwest of Payson on West Mountain has developed a product which combines apple and cherry juice. Both of these processing facilities have quite limited capacity. The new plant is fully supplied with its raw stock of the two fruits from an affiliated packinghouse



for apples and from the preparation lines of connected freezing facilities for cherries.

Summary of facilities

Because so many apple handling facilities in the Four Corners Region are small operations whose output varies greatly with quality of fruit, it is difficult to estimate precisely the total capacities available. The major facilities, with relatively reliable performances provide the following totals for the three currently producing states.

<u>State</u>	<u>1970 Production tons</u>	<u>Approximate Storage Capacity tons</u>	<u>Approximate Packing Capacity tons/hour</u>
Colorado	31,500	13,860	73.5
New Mexico	12,750	2,500 - 2,700	42 - 51
Utah	13,750	8,400	31

In Colorado and New Mexico, where outlets are found rather quickly for each season's production, about 20% of the crop can be stored. Utah, which supplies its internal market for much of the year, can store about 60% of the crop. The longer season also permits Utah to use smaller packing facilities.

## FACILITIES DESIGN AND COSTS

This section outlines the type of facilities considered most suitable for apple storage and packing operations in the Four Corners Region, recommended layouts of buildings and equipment, and the estimated costs of owning and operating such facilities under present conditions. For purposes of illustration, a typical complex handling 2,600 tons (125,000 bushels) of loose fruit is assumed, from which 2,100 tons (100,000 42-pound boxes) will be packed out during the year, 80 percent in trays, 20 percent bagged. Individual or corporate ownership may obtain; the latter, perhaps, in form of a cooperative organization.

Fruit is either delivered in bulk bins or, if delivered loose, put in such bins for storage at harvest. During the year, bins are removed from storage and the fruit is graded, sorted and packed in 42 lb. cartons either in trays or bags.

### Packinghouse and storage design

Clear-span prefabricated steel construction, with colored metal sheathing, and insulated with fiber glass bats is probably the most practical design for packinghouse and storage facilities in the Four Corners area. It should have nominal eave height of 16 feet and a ridge height of about 21 feet. This will provide clearances of 12 feet minimum and about 18 feet maximum. The floor slab of 5-inch reinforced concrete should be carefully sloped to drains to facilitate hosing down when needed. Areas under the dumper and the undersize and leaf eliminators might well be curbed or recessed to control excess drip water.

The storage facilities are of the same type construction with a minimum clearance of 24 feet under the frames. This design dimension will permit nine-high stacking of bulk bins with ample refrigerated-air circulation space above the fruit. Recommended interior insulation is sprayed-on polyurethane to a thickness of two inches. Ceco-Slex 1502, or some product with equivalent insulating properties, should also be applied on the roof.

#### Layout of packinghouse and storage facilities

Figure 4 shows the recommended location of the packinghouse and storage rooms in relation to each other on a site, together with an allocation of space within the packinghouse to the different operations and functions. All facilities should be on grade level with the possible exception of the loading area. If loading at truck-bed level is wanted, it can be provided by installing a docking well, which should be made of concrete and equipped with a good drain. The bin yard as well as all areas between and adjacent to the buildings should be paved to facilitate forklift transport.

The layout shown in Figure 4 illustrates a first stage of project development in which only one room of the storage facilities is completed. This phasing is practical, of course, where the initial volume is only 840 to 1,260 tons but is expected to grow to the 2,600 ton level as orchards mature, or as more producers join in the enterprise. As noted in the financial analysis below, however, capital investment and annual cost figures are estimated for the completed complex and the projected total volume.

Fig.4 APPLE PACKINGHOUSE AND STORAGE FACILITIES LAYOUT

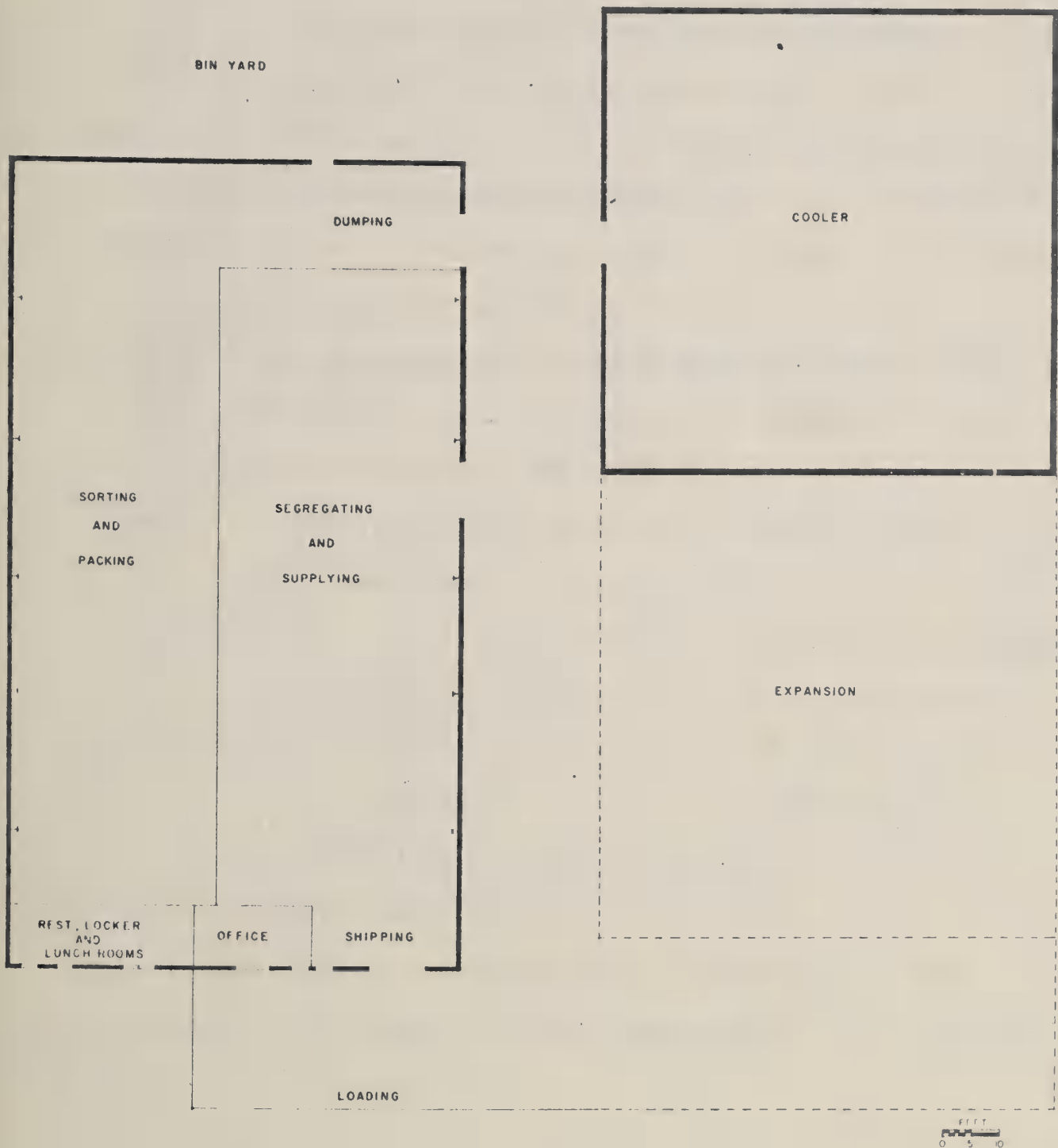


Figure 5 illustrates a suggested packing line layout planned for the L-shaped area designated for it in Figure 4. Functionally it is planned to allow: maximizing the areas available for building supply banks of loose fruit, segregating the packed product on unitized loads by size, assembling shipments for fast loading, and providing space for carton storage and makeup. Installation of the fixed equipment along the far walls of the packinghouse minimizes handling problems, particularly forklift transport. Feed to the immersion dumper was positioned primarily for convenient access from the storage rooms, but is equally accessible for fruit being handled direct from orchard. While only stubs of the take-away bin track are shown in the drawing because of space limitation, the layout contemplates an extended gravity run-out into the bin yard which will carry empties well out of the way of other operations. With 20 to 24 feet of such bin track, forklift removal of empties will be required only every 12 or 15 minutes of probable dumping rates.

#### Estimated costs of packing and storage facilities

Estimated total investment cost of the apple packing and storage facilities described and illustrated above is \$417,000. See Table 9.

Itemized analysis of the required total investment is listed in Table 10. This includes the complete complex of facilities and equipment. Planned acquisition of the packinghouse and equipment line, of course, should be for the final target volume if this is expected to be achieved in two to four seasons. The second storage room one forklift truck, and proportionate

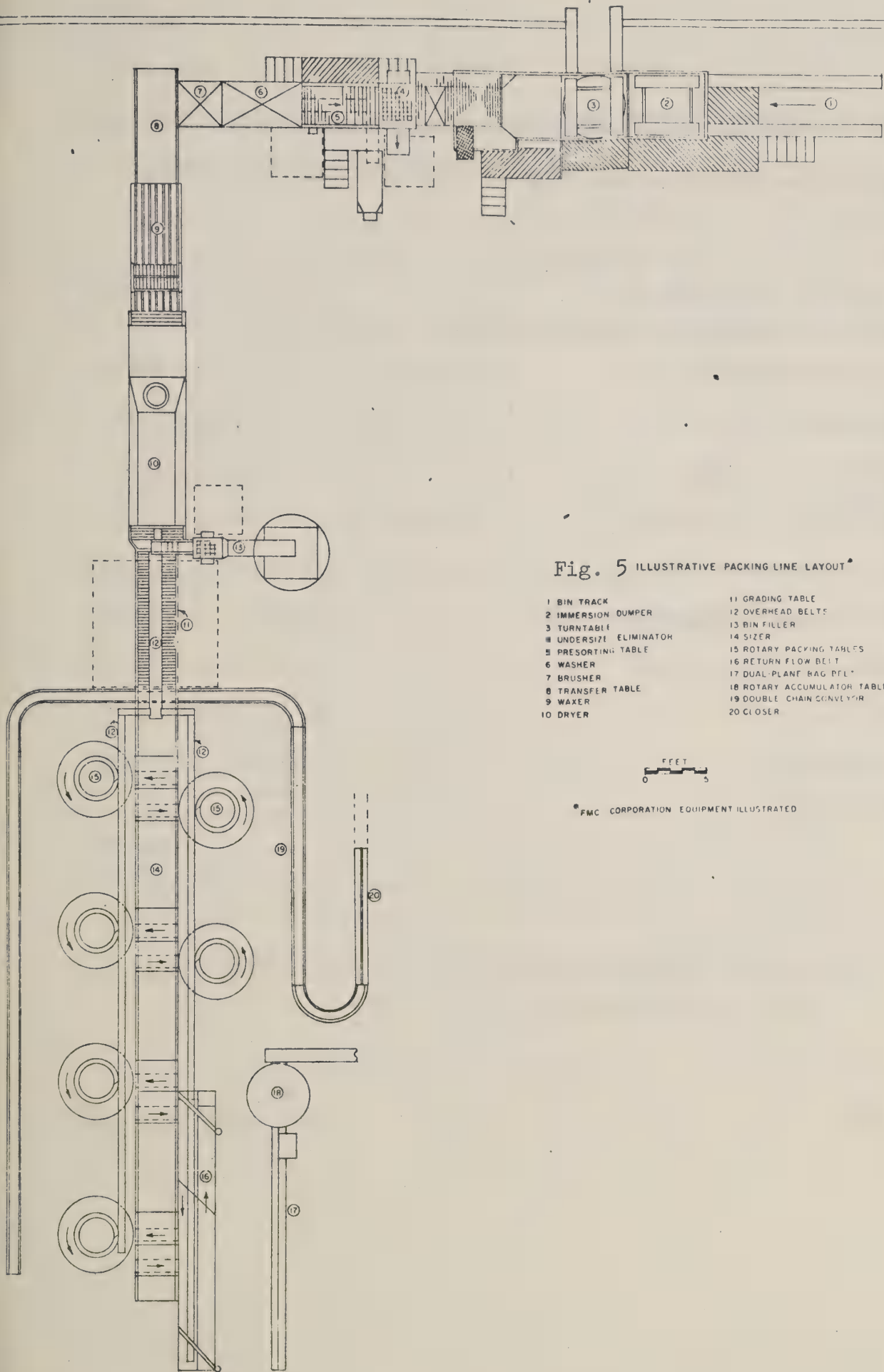


Fig. 5 ILLUSTRATIVE PACKING LINE LAYOUT\*

- |                        |                             |
|------------------------|-----------------------------|
| 1 BIN TRACK            | 11 GRADING TABLE            |
| 2 IMMERSION DUMPER     | 12 OVERHEAD BELTS           |
| 3 TURNTABLE            | 13 BIN FILLER               |
| 4 UNDERSIZE ELIMINATOR | 14 SIZER                    |
| 5 PRESORTING TABLE     | 15 ROTARY PACKING TABLES    |
| 6 WASHER               | 16 RETURN FLOW BELT         |
| 7 BRUSHER              | 17 DUAL-PLANE BAG FILLER    |
| 8 TRANSFER TABLE       | 18 ROTARY ACCUMULATOR TABLE |
| 9 WAXER                | 19 DOUBLE CHAIN CONVEYOR    |
| 10 DRYER               | 20 CLOSER                   |

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\* FMC CORPORATION EQUIPMENT ILLUSTRATED



TABLE 9.--Estimated investment amounts in apple storage and packing facilities and equipment for a 125,000-bushel (2,600 tons) operation 1/

Facility or equipment	Units	Cost/unit	Amount
Site and preparation	3 acres	-----	10,000
Packinghouse, 80' x 140'	11,200 S.F.	5.00	56,000
Storages:			
2 rooms, 80' x 80' x 24' each	12,800 S.F.	7.00	89,600
Refrigeration equipment	75 tons	800.00	60,000
Equipment line -- 500 box/hr.	-----	-----	60,000
Forklift trucks -- 4,000 lb. caps.	3	9,000.00	27,000
Bulk bins, 48" x 48" x 28"	5,000	15.00	75,000
Pallets, 40" x 48"	800	5.00	4,000
Miscellaneous <u>2/</u>	-----	-----	15,000
Contingency 5%	-----	-----	20,000
Total	-----	-----	416,600

1/ Loose-fruit basis; 100,000 boxes packed out (2,100 tons).

2/ Small truck, office equipment, handtools, etc.

numbers of bins and pallets would be deferred under staged development until needed. Such engineering and architectural work as is required in prefabricated steel construction is furnished by the building manufacturer or supplied by the contractor.

Average annual fixed costs of the facilities and equipment constituting the total project are estimated at approximately \$85,600. These are itemized in Table 10. Interest and taxes in beginning years will have to be budgeted for substantially more than the amounts shown here since these are the average costs over the life of respective items. Provision for return on such equity capital as may go into the project should be made at the interest rate under the principle of compensation for foregoing alternative investment. Helping offset the higher interest costs in early years of the enterprise are the amounts budgeted for maintenance and repair which, presumably, will not be needed as much then as in the latter half of the lives of the assets assessed.

Estimated annual operating costs based upon packing out 100,000 boxes of fruit (2,100 tons) from 125,000 bushels (2,600 tons) delivered to the facilities are \$137,000. Itemization of these costs and notation of the basis upon which estimated are contained in Table 11. Average output is projected at 200 boxes per hour (4.2 tons/hour) or two trailer loads in an 8-hour day. This is a very conservative operating rate given the size of the crew and the capacity of the equipment. It should easily be attained and exceeded with corresponding savings in operating payroll as long as the

Table 10.--Average Annual Fixed Costs of Facilities and Equipment  
for a 125,000 bushel (2,600 tons) Apple Packing Operation

Total investment --	\$417,000	
Interest (7% on one half of total investment) . . . . .		\$ 14,600
Depreciation: 15 year life for buildings and packing line . . . . .		17,700
5 year life for trucks, pallets, bins . . . . .		24,200
Maintenance and Repair (5% of total investment) . . . . .		20,800
Insurance and Taxes (2% of total investment) . . . . .		8,300
		<hr/>
		\$ 85,600

TABLE 11.--Estimated operating costs for a 125,000-bushel\* (2,600 tons) apple storage  
and packing enterprise

Item	Amount	Basis
Packaging materials -----	\$ 60,000	Cartons, trays, and wraps @ 60¢; masters and bags @ 50¢
Operating payroll -----	25,000	Crew of 28; paid \$1.75 to \$2.25 per hour, totaling about \$50.00 per hour; 500-hour season
Management and office -----	25,000	Full-time manager; clerk-bookkeeper for 6 mos.; office supplies and expense
Maintenance -----	12,000	Full time
Utilities -----	5,000	Electric power, water, natural gas, propane, and gasoline
FICA taxes -----	3,000	5.2 percent of \$62,000
Insurance -----	2,000	100M-300M public liability; 25M property damage; workmen's compensation @ 2.15% of payroll
Miscellaneous and contingency ---	5,000	Wax and DPA materials included here
Total -----	<u>\$137,000</u>	

\* Loose-fruit volume; estimated 100,000-box packout (2100 tons).

wage scale assumed prevails. To the degree that productivity increases keep pace with wage rate rises as the project gains operating experience, unit labor costs will remain constant.

Summarizing the estimates, the combined annual average capital and operating costs for the project are:

Annual capital cost -----	\$ 85,600
Annual operating cost -----	137,000
Combined annual costs -----	<u>\$222,600</u>

Selling and promotion assessment costs will probably be in the range of 20 to 25 cents per box on average. This means that the aggregate of all projected marketing costs from storage or packinghouse door through sale f.o.b. shipping point for this enterprise is estimated at slightly more than \$2.45 per box (\$116 per ton). This can be compared with the range of \$71 - \$112 per ton estimated for other similar facilities.

#### Feasibility of Controlled Atmosphere Storage

As the need for additional storage capacity arises, Regional management must decide whether to expand existing conventional facilities or to construct controlled atmosphere (CA) space. Some of the economic considerations involved in this decision are discussed below and pointed up in cost analyses which follow.

During overlapping periods of recent seasons, apples from controlled atmosphere storage have sold at substantial premiums over fruit of the same grade and size from conventional storage. Not all of this premium, however, should be attributed to the superiority of CA as a storage medium. In many

instances, much of the better condition of the CA fruit was present initially in the relative quality of the apples loaded in to storage. Also, since the apples stored under CA are usually select fruit from the better orchard blocks, they probably average higher in range of quality within the same grade.

The seasonal pattern of apple prices in recent years generally has been downward through January, by which time most regular storage fruit is marketed, and then upward in succeeding months. Whether or not this pattern continues to prevail in future seasons is uncertain. Continuing expansion of CA storage capacity will bring pressure on late season prices. On the other hand, the substantial prospective increase in production may result in such oversupplied market conditions in the first half of the season as will actually widen the historical price differential between the two periods.

Estimated total cost of a detached controlled atmosphere apple storage facility of 40,000-bushel (840 tons) capacity is \$123,000, or just over \$3.00 per bushel. The estimate includes the necessary investment of \$30,000 in bulk bin containers. Itemized costs are as follows:

	<u>Dollars</u>
Storage building--4,000 sq. ft. @ \$7.50-----	30,000
Insulation, vapor barriers--15,440 sq. ft. @ \$.65-----	10,000
Refrigeration equipment--40 tons @ \$800-----	32,000
Atmosphere equipment--(Arcagen-8* or equivalent)-----	16,000
Bulk bins--2,000 @ \$15-----	30,000
Contingency -----	5,000
Total -----	<u>123,000</u>

(\* Atlantic Research Company, Alexandria, Virginia, generating and scrubbing equipment, installed.)



Contemplated design of this facility is for an eight-inch concrete block structure, nominally 50' x 80' in plan, bisected in the long dimension by a similar block partition wall to make two rooms approximately 50' x 40'. The building would be on grade with a 5" reinforced concrete slab and a 20-foot paved apron across the front. Roof framing would be steel-truss construction bearing on reinforced pilasters equidistant in the side and partition walls and supporting a purlin grid. A height of about 24 feet is necessary to provide adequate air circulation space over a nine-high stacking pattern. Sprayed-on polyurethane insulation inside and insulated decking under a builtup roof are also included in the estimates.

Total annual costs of owning and operating a CA apple storage facility such as described above are estimated at approximately \$29,000. Assuming an 85-90 percent packout, unit cost would be 80-85 cents per packed box sold. The itemized yearly cost figures are as follows:

	<u>Dollars</u>
Depreciation:	
Insulated building--\$40,000 over 20 years-----	2,000
Refrigeration equipment--\$32,000 over 12 years-----	2,700
CA equipment--\$16,000 over 6 years-----	3,000
Bulk bins--\$30,000 over 10 years-----	3,000
Total depreciation-----	<u>10,700</u>
Average interest--7% of \$61,500 ( $\frac{1}{2}$ total investment)----	4,300
Taxes, insurance, maintenance (7% of total investment)--	8,600
Total fixed costs -----	<u>23,600</u>

	<u>Dollars</u>
Operating costs:	
Utilities, propane, etc.-----	3,000
Supervision, inspection, control, M & R-----	1,000
Loading in and out (200 fork-man hrs. @ \$5.00)---	1,000
Total operating costs -----	<u>5,000</u>
GRAND TOTAL annual costs ----	<u>28,600</u>

The annual unit cost of about 82 cents per box found in the analysis above is not to be compared with prevailing CA storage rates at commercial installations throughout the country. It is estimated upon a basis which differs from the use of rented storage in two important respects: (1) It includes the cost of bins; custom rates do not. (In rented storage, growers usually furnish their own bins; where those of the warehouse are used, there is an added fee.) (2) This estimate is on a packed-box basis; custom rates are for loose fruit. Giving effect to these differences, the annual cost of owning and operating CA storage facilities such as described above would be about 65 cents per 42 pounds of loose fruit as compared to going rates of 55-75 cents per unit in major producing areas. In some sections, owners of the fruit incur additional expense in transportation to and from the rented storage.

## MARKETING OBJECTIVES AND ORGANIZATIONAL IMPLICATIONS

The market objective and long-term producer response is basic to the goals and recommendations of this report. Suggested objectives in this section represent the thinking of numerous apple industry people and the authors.

### Marketing Objective for Four Corners Region

A basic objective for the apple industry should be to supply the market. While market needs are diverse, the dominance of the retail chain sets the direction for apple producers. The retail chain's requirements include high quality, uniform appearance, and good internal condition. Chain buyers usually prefer to handle several varieties in selected sizes prepared in bulk, tray pack, or prepackaged. They want fruit in single or multiple car lots delivered within a short span of time, and prefer uniform orders for as much of the season as possible.

Producers able to meet these buyer needs get the highest gross return. Commercial producers who are planting large uniform blocks of fruit and applying uniform and good cultural practices indicate their recognition of this market demand. Newer spur-type strains in compact plantings are a significant factor in fulfilling buyer's desires and increasing producer returns through lower unit production costs.

### Variety and Strain

Problems in achieving uniform appearance frequently occur for both producers and packing sheds when dissimilar lots of apples from small and

medium-size producers must be combined. Lower prices may be received for the apples, and the packing shed may experience high grading costs. The packer may have difficulty building a quality reputation. Producers in several of the region's production areas, such as Utah, can't easily join to pack and sell their dissimilar fruit.

Some of the problems caused by the diversity of strains within an apple variety could be solved if concerted efforts were made to use only selected strains when replanting or expanding. Encouragement and incentives to use only selected strains could come from custom packing houses, cooperatives, horticultural associations, Extension Service, and others.

Only apple strains expected to be in great demand by consumers and with highest profit potential for 10 to 20 years should be selected. Joint selections by selling agents, shippers and growers, in consultation with Extension horticulturists and others, could help find strains satisfactory for both production and marketing.

Many small and medium-size producers must improve quality and uniformity to remain independently viable and a factor in the apple industry. Only through better coordination can these producers avoid being greatly out-classed by fruit produced in large blocks under single management.

Improving fruit appearance and uniformity by planting new trees is closely related to reducing production costs and stabilizing producer returns. Both ideas are tied to investing in spur-type strains set in more compact plantings.

## Cultural Practices

Differences in apple appearance and condition frequently stem from variance in orchard cultural practices. Packing houses might discuss quality with the producer at harvest to impress on him the importance of doing a better job in the orchard. Those failing to respond may see packers refuse their fruit with no other suitable outlet available.

Further efforts to influence individual performance should be made, particularly during the producing season, with small and medium-size producers and those with off-farm jobs. The packing shed manager is an ideal source of information about services and materials. He can help line up spraying or other services for producers unable to find such services and he can keep in close touch with producers known to have difficulties. However, some shed managers may not consider this follow-through function to be a part of their job.

In numerous fruit areas, marketing cooperatives offer production services that are not generally found in Utah, Colorado and New Mexico. In these States, the producers with inadequate spray equipment should consider developing a cooperative spraying service in their community or county. The service may be associated with or apart from a packing shed. Custom packers should consider offering spraying or other services at or slightly above cost to help assure that good quality fruit is received at the packing house.

## Competition

Most buyers are looking for the best price of a specific range of quality. Producer-shippers tend to compete with each other in making a sale. As a

result, prices are frequently cut to move fruit. The price cuts are probably more than necessary to keep out fruit from the Northwest, and lower prices may not substantially increase the total quantity of fruit sold. Fewer sales desks could reduce unwarranted price cutting.

### Selling Power

A uniform pack improves a production area's image and its ability to sell to desired outlets. Some differences in quality and appearance of field-run apples can be handled by well-trained and supervised packing house workers, receiving direction from a central source. Also, long-term efforts to encourage producers to use the same varietal strains when replanting and following recommended cultural practices will help improve uniformity.

Shipper's or salesmen's access to large quantities of uniform fruit is a prerequisite to filling multi-truck lot orders and repeat orders. A central sales organization serving producer-shippers in a production area represents the greatest access and control over fruit sold.

### Coordinated Sales Implications for the Region

Indicators of a need for sales coordination can be found in production areas in Utah and Colorado, and in some cases in New Mexico. They include:

1. Cut-throat sales competition among a large number of sellers.
2. Fragmented sales strength.
3. Occasional cooperation between houses filling an order.
4. Inability to fill mixed loads and orders during latter part of the packing season.



5. Chain buyers switching to Northwest shippers when one supplier can't give them the varieties and sizes they want.
6. Too many brands confusing customers.
7. Buyers wanting stricter grading and improved uniformity.
8. Buyers expecting greater pack uniformity from central sales organization.

Deterrents to coordination on sales include:

1. Difficulty in getting single uniform lots.
2. Non-uniform grading in different sheds.
3. Lack of producer confidence in the selling agent to give fair treatment to all sheds in timing fruit movement.
4. Unwillingness of producers to pool fruit.
5. Disagreement on how tenaciously to pursue price holding policies.
6. Lack of producer confidence in sales agent's ability to cover all buyers, particularly for small sales.
7. Independent and competitive attitude by producers, packer-shippers, and sales personnel.

#### Sales Coordination Outside of the Region

Potential benefits from coordination could well mean new sales outlets in California, Texas, Oklahoma, and Kansas. Benefits could come from reducing selling costs, using fruit from all production areas to complete

orders, expanding sales to these markets, and reducing producer competition in selling.

Apple sales to California are made by at least 7 of the larger Utah shippers and by 3 to 5 Colorado marketing agents or shippers. Several New Mexico shippers also have sold or have the potential of selling to California markets.

Some Utah shippers look to Texas for the sale of both quality and off-grade fruit. Increasing amounts of quality Utah fruit will put more pressure on moving off grade fruit to Texas or other areas if this fruit is to be sold.

Colorado shippers seem to use Texas markets more than Utah producers. When supplies of red delicious apples become short, Colorado shippers might find Utah red delicious apples helpful in moving the other varieties in mixed orders to some Texas markets.

Some producers around Farmington, New Mexico, could use a joint marketing agency for sales in Texas and other States. If north central New Mexico production continues from surviving trees or new plantings, major shippers there also could find services of a joint agency helpful. The early harvest, variable quality, lack of storage, and unwaxed apples from the Hondo, Penasco and Mimbres Valley would inhibit coordination among these producers by a joint sales organization.

Oklahoma and Kansas markets also fall within the tri-state sales territory.

### Sales Coordination Within the Region

Coordinated sales may help shippers serve and hold their traditional markets, particularly as the season progresses, by drawing needed varieties and sizes from more shippers and production areas. It might also assist in more orderly movement of fruit and reduce the chances of one production area "dumping" fruit on another area's traditional market.

### Colorado

Any plan for joint efforts by Colorado shippers requires analysis and agreement on the duration of the season they wish to follow. Currently, shippers strive to complete the western Colorado apple deal as early as possible, with the end of December as their target. An effort to market more apples in Colorado would involve determining whether to intentionally supply buyer's needs during the cold storage season into February and March; and in future years, extend the season with controlled atmosphere (CA) storage. This would be similar to what Utah producers are now individually doing. A promotion program could create a greater demand for Colorado apples in competition with Washington State apples.

### Delta County, Colorado

Buyers believe that major firms in Delta County generally supply quality fruit meeting required specifications. Benefits from a sales consolidation of these organizations do not appear adequate to justify a consolidation.

Up to 80,000 boxes of unwaxed apples are packed by 5 independent producer-shippers in Delta County. Some of these apples would not meet extra fancy grade. Most are sold outside of Colorado. If their fruit were acceptable, these producer-shippers would not expect to receive higher returns by selling through an existing custom packing shed as long as they can sell unwaxed fruit.

#### Mesa County, Colorado

As apple production increases and facilities improve, Mesa County will become a more important factor in the Colorado supply situation.

After 1972 there will be four sales desks in the county--all handling waxed apples. Three major shippers have established markets, partially in differing territories. Much of the county's new apple production apparently will be from strains that color adequately regardless of fall temperatures. With differing proportions of poorly colored apples and apparently established outlets, we doubt that consolidating sales desks would benefit Mesa County producers at this time.

If apples from new plantings color adequately each year, a major obstacle to coordinating efforts between shippers of Mesa and Delta counties would be removed.

#### Montezuma County, Colorado

Improvements with insect, disease, and marketing problems might be found through concerted efforts of Montezuma County producers. Most commercial producers have only the lowest level market outlet available to them--farm

sale of tree-run fruit to truckers. There appears to be a continuing hope by some producers and others that a packing shed can someday be built to market apples better--and possibly store fruit. There may be enough fruit of acceptable variety and type to warrant a detailed analysis and plan for a relatively low-cost packing operation capable of preparing truckload lots of waxed fruit. Such an analysis could either show the type of facility most likely to succeed, or dispel any notions of shed development. The latter would open the question of whether to continue producing for the trucker outlet or cease apple production entirely.

Before suggesting detailed analysis would be worthwhile, producers must be willing to accept several conditions. These would include:

1. Placing cooperation above animosities and independent attitudes.  
Individual independence could be enhanced through cooperation on marketing and possibly on certain production operations.
2. Following recommended cultural practices for production of quality fruit on their own initiative and resources. If equipment or timeliness of operation are bottlenecks, consider developing custom production services cooperatively to overcome these problems.
3. Adopting a replanting program to ensure enough fruit to operate the packing shed in future years, to gradually move into varietal strains most in demand, and to help ensure apple producers continued operation.
4. Delivering all quality fruit to the packing shed and abide by its by-laws, marketing agreement, or contract.

5. Financing the packing operations through initial stock purchase and by investing from earnings once in operation. Several examples of producers owning a cooperative corporation or ordinary corporation can be found among apple packing sheds in the three-state area.
6. Serving on a board of directors, selecting a manager for the packing season, and abiding by delivery, working, and other rules and guidelines established by this management team.
7. Soliciting and accepting marketing services of an established area marketing firm or broker at market location as one of the most acceptable techniques in finding market outlets for their fruit.

If interested, area producers should take the initiative and ask for help from the County and State Extension Service, Agricultural Research Service, and Farmer Cooperative Service when analyzing and planning ownership, size and type of facility, and operating structure.

#### Utah

Many full-time Utah County producers close to wholesale and retail store buyers in the Salt Lake City area, pack, sell, and deliver their own fruit. Their ability to find and serve buyers in other states when the local market is oversupplied for long periods, however, has usually been limited.

About 27 packing sheds operated in the county in 1970-71. The number of independent producer-shippers has been decreasing, and will continue to decrease as smaller producers go out of business or rely on other packing sheds.



For a number of years, some producers have gained an edge over competition by using cold storage to hold most or all of their crop until most lower quality, competing fruit cleared the local market. This marketing practice has become so widespread that prices increase little if any during the cold storage season. Storage has been extended by controlled atmosphere storage--with desirable results. But, excessive construction of CA storage could erode the current advantage, as occurred with cold storage.

To help secure at local markets the highest possible prices some producers have striven to improve uniformity and appearance by washing, waxing, and strict grading, and by long-term investment in spur-type species, primarily red delicious. Under top cultural management these newer species display highly uniform well-colored fruit, resulting in lower production costs and improved efficiency in packing house operations.

Expected production increases of Utah supplies in the next 10 years will increase the difficulty of all producers moving their fruit into the Utah market. For example, three major packing houses that handled about 25 percent of the 1970-71 crop note increased volume from their producers' new plantings and expect their volume in 10 years to reach about 60 percent of the 1970-71 crop.

Promotion may help capture more of the Utah market, and CA storage will help extend the season, but all shippers will need to increase their out-of-state sales. Independent producers, especially those with older plantings, will find it more difficult to sell their apples to quality conscious local buyers and will feel more pressure to locate adequate out-of-state markets.

Two choices are suggested. Neither, however, will appeal to every producer and every sales desk.

The first choice is a cooperative sales agency owned and controlled by producers through their board of directors. Further information on organizing and operating such an agency is suggested later in this report.

All packers under a cooperative sales agency would conform to strict grading standards and probably be required to wax fruit. Pooling arrangements, including differentiating some red delicious strains, would facilitate equitable treatment and encourage participation of producers holding new plantings of spur-type strains.

The second suggestion is a private marketing agent selling fruit for affiliated packing sheds. All packers would have to conform to strict grading standards and probably be required to wax fruit.

Setting up any kind of joint selling effort will be complicated. We do not have data to support a statement that prices for Utah producers would be higher or more stable with fewer sales desks. Substantial increases on the local market should not be expected because buyers can purchase fruit from other areas.

Numerous independent producer-shippers offering buyers quality unwaxed fruit at attractive prices have substantially lower cash packing costs than cooperative and custom packing sheds offering waxed fruit. Their lower costs frequently reflect use of family labor, paid-off investment, and failure to expect normal market rates of return for investment and labor. Some reasons independents shy away from consolidated sales ideas include: investments

required, higher cash packing charges, potential loss of post-harvest employment, surrender of sales control, variance in fruit quality and appearance, unwillingness to pool, pride in being a shipper, and other features of the rugged individualist combined with inadequate demonstration of higher returns immediately from consolidated operations. Generally, it seems that producers do not recognize they could be better off as rugged individuals marketing cooperatively.

### New Mexico

Feasible suggestions for coordinated sales among New Mexico producers in the foreseeable future are not apparent. Extreme cold temperatures in January, 1971 killed or injured apple trees in Valencia, Bernalillo, Sandoval, Santa Fe and Rio Arriba counties. A commercial crop loss of 80 percent is expected. Since the freeze, approximately 13,000 apple trees were planted for commercial production, primarily in Santa Fe and Rio Arriba counties. The Cooperative at Chimayo, New Mexico has established a loan fund to assist members in securing new trees, removing old trees, financing the application of recommended cultural practices and encouraging installation of frost equipment. Funds are available for an anticipated 35,000 new trees. While these efforts will help to encourage expanded and quality apple crops, production in central New Mexico will remain at low levels compared to past years for at least eight years.

Remaining production areas in San Juan, and Lincoln counties are too widely dispersed and complicated by wide differences in apple quality and in waxing and packing capabilities to expect a coordinated sales effort to succeed. Most apples produced in southern New Mexico are sold in Texas.

## METHODS OF COORDINATING MARKETING

An objective of this study is to suggest ways for Mountain State apple producers to improve their returns. Suggestions are made to stimulate thought and discussion among producers, packers, and sales personnel. Only through mutual effort can they find workable routes leading to more orderly marketing, stable prices, and improved income.

### Centralized Selling

One long-term approach for more orderly marketing is developing a coordinated marketing program under cooperative ownership. This program is an organizational procedure that enables participating firms to enlarge and strengthen their market position and obtain benefits they could not realize from individual efforts. The resulting arrangement aims to stabilize the industry and return a fairer margin to grower-owners from sales without disturbing the grower-shipper relationship.

Other possible benefits accruing through marketing coordination include lower unit sales costs, lower promotional costs, adequate financing by aggregating resources, better market distribution, more orderly marketing of total production, higher total sales value of production, and improved standardization of packs.

Potential members of a joint marketing program should appoint a study-organizing committee to appraise the chances for a successful operation. The committee should study present operations, current weaknesses, changes expected, and potential for a coordination program to serve operating needs, correct weaknesses, and adapt to changes. Emphasis should be given to volume, quality, and other specifications.

If economic need for the organization is considered adequate, the committee should give attention to:

1. Defining objectives of the sales program such as reducing market-costs, capturing a greater share of selected markets, and gaining higher returns.
2. Choosing marketing methods. Will the organization develop a brand? What consideration should be given to individual brands? Will the sales manager be given final authority for all sales decisions?
3. Establishing and adhering to a quality control program from the farm level to the packed apple.
4. Participating members. How will ownership and control of the organization be exercised? What will be the provisions of a marketing agreement with members? Will members turn over all fruit and sales outlets to the organization? Will understanding between members and management be fostered by regular meetings and a newsletter?
5. Determining need for a centralized accounting system and frequency of supplying members with financial statements.
6. Appraising the need for joint purchasing of packing and production supplies.

The organizational structure for coordinated marketing arrangements should be flexible, based on services provided, and as simple as possible. For example, a brokerage organization needs no elaborate structure. In contrast, a highly sophisticated program--including packing, storage, transportation, and financing--would require a well-developed organizational structure.

When planning a coordinated marketing program that includes diversified product selling and handling farm supply for producer-members, we suggest setting up distinct departments for sales, accounting, and purchasing. Personnel in these departments would be responsible to the general manager. The general manager, in turn, would be responsible for carrying out the policy directives of the board of directors.

Figure 6 shows a diagram of a proposed organizational plan incorporating these suggestions. Cooperatives generally look to professionals for verifying qualifications under the Capper-Volstead Act, for legal and engineering help, and for help in such areas as quality control, management, tax, and financing.

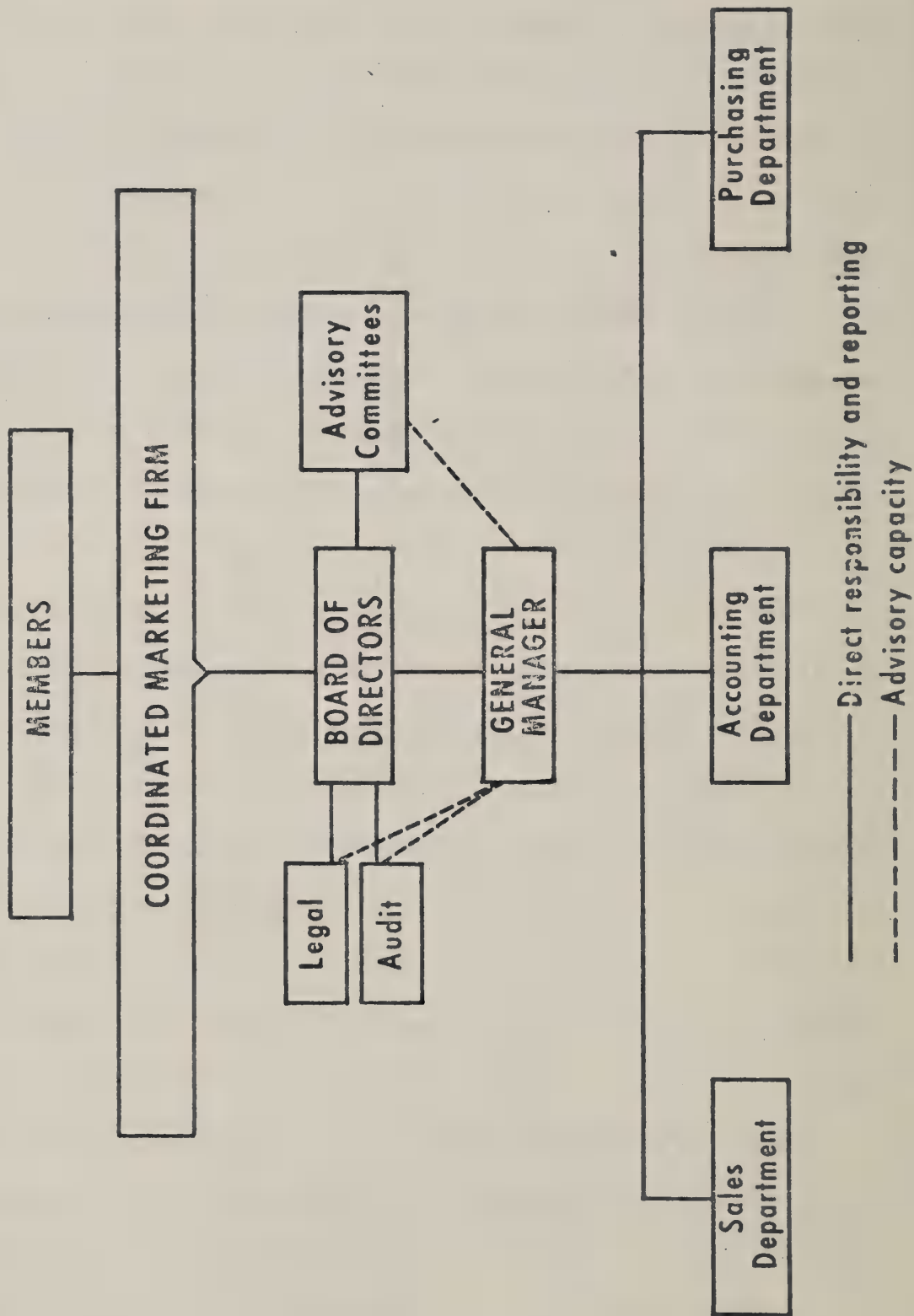
The responsibility of organizational policy in a cooperative is delegated to the board of directors by the members. Directors should be primarily concerned with broad policy considerations, and the manager with implementing these policies through day-to-day decisions. Members should represent the true governing force of the association through the elective process, their contacts with directors, and their decision to extend or withhold patronage. Therefore, the extent to which an association can achieve the objectives or goals of its membership will largely determine the ultimate success or failure of the cooperative enterprise.

To be most effective, policy should be clearly defined and in keeping with the basic philosophy of the organization. It is highly desirable to put policy matters into written form. This approach, in addition to forcing management to consider and crystalize its thinking on objectives and procedures,



FIGURE 6

# SUGGESTED ORGANIZATIONAL STRUCTURE FOR A COORDINATED MARKETING OPERATION



allows competent employees to make decisions consistent with stated aims. It also permits comparisons of individual opinions of the association's operations with the written objectives.

As the operation of an association becomes more complex, the directors may find it desirable to hire the services of professional consultants. (1)\*

#### Centralized Selling in British Columbia

In discussions of industry-wide efforts and joint selling, numerous shippers wanted to learn more about the sales arrangements in British Columbia, Canada. The Appendix contains a description of the British Columbia system. Further information is available for those interested. (2) Legal authority and precedent do not exist in the United States to permit centralized selling as practiced in British Columbia and so it is not considered an immediately useful model for the Four Corners Region.

#### Pooling - A Tool for Orderly Marketing

As used in a Farmer Cooperative Service publication, "the term 'pooling' refers to a method by which a cooperative can handle and pay for members' produce. It can involve the commingling of the products from many producers, the combining of sales returns and operating expenses, and the prorating of net returns among members in proportion to the volume of business each transacts through the cooperative over a certain period of time.

"Pooling is a means of spreading market risks. While no one grower gets the highest price during the term of the pool, each grower is assured that he will not be hurt by receiving the lowest price. Pooling enables

\*Numbers refer to notes at end of chapter.

the management of a cooperative to plan an effective marketing program by controlling the time, place, and form in which produce is sold. Pooling may also make it easier for a cooperative to obtain needed finances." (3)

Orderly handling of the apple crop during the harvest period is an essential part of orderly marketing. Events and returns during the harvest period may influence a producer's attitude toward cultural practices in following years and his willingness to work with others to solve mutual problems.

Depending upon the production area and variety and quality of apples, a producer may have to choose--depending on fluctuating prices--among a fresh market, processor, or trucker outlet. Delaying this decision can lead to fruit remaining on the tree beyond a period when quality is satisfactory for fresh or processed use. If this occurs frequently the producer may feel less pressure in the long run to produce for a quality fresh market.

Another problem may be uncoordinated picking, packing, and cold storage with apples stored for several days at air temperature. This may lead to quality deterioration and unsatisfactory keeping quality for storage or short retail shelf life. This problem may be aggravated by all producers striving to sell on a temporarily high market that packing capacity cannot accommodate.

To the extent these operational problems could be dealt with through better cooperation among producers, pooling techniques might be used to help achieve equitable treatment.

An orderly marketing program is necessary to compete effectively in the market year after year. To promote orderly marketing, the management of a marketing agency rather than the producer must have control over apples. "In cooperative marketing organizations, pooling as compared to non-pooling is generally the more satisfactory method of making this transfer possible." (3)

#### Pool Payment Practices

There is no single method for operating a pool. The participants in a pool should work out operating procedures which fit their situation. Pooling arrangements become more complex as: (a) Number of grades, sizes, and varieties increases; (b) Length of the pooling period increases; and (c) Pooling system extends beyond a local area. In the Farmer Cooperative Service study, cooperatives handling apples usually pooled on the basis of variety, with further division by grade and size.

In a marketing corporation, the board of directors should establish terms and procedures for operating the pool prior to the marketing season, and inform producers.

The length of time for a pool depends on the objectives of providing incentives to producers and distributing economic risks arising from short-time price fluctuations. The FCS study showed that seasonal pools were most frequently used by cooperatives marketing apples in 1959. It is known that some cooperatives operate an early season pool, a second pool covering a majority of the cold storage season, and a third pool for CA apples.

When pools are long in duration, final payment to producers may be delayed, since pool computations cannot be made until the end of the pool

period. This works a hardship on producers needing funds to cover loans and other expenses. To overcome this shortcoming, some cooperatives have adapted, or shifted to, a shorter pooling period while others have advanced harvesting costs or cash according to growers' needs.

One problem in pooling is that the product of one grower may be at the top of the grade and that of another grower at the bottom. Both may be sold in the same pool, thus discouraging high-quality production. It is important, therefore, to have strict grading and other requirements to hold high-quality producers.

The FCS study indicated small lots were generally pooled with other lots, regardless of lot size, rather than being handled separately or combined with other small lots before pooling.

Pools are usually operated to reflect market price differentials between grades and sizes. In some years, unusual quantities of certain sizes or grades may occur with the result that small size fruit returns more than larger sizes, or lower grades return nearly as much or more than higher grades. In these cases, the board or committee setting pool policy may adjust prices paid producers to reflect desired price spreads and to avoid encouraging production of undesirable fruit.

#### Authority to Pool

Authorization to pool proceeds from sales of products is usually established by contract between the producer and his marketing agency.

#### Selected Anti-Trust Implications

Concern has been expressed about the anti-trust implications of joint selling. Briefly, the Capper-Volstead Act authorizes fruit growers to act



together in associations to collectively market their fruit in interstate commerce. These associations must, however, be operated for the mutual benefit of member-producers, not deal in fruit of non-members to an amount greater in value than fruit of members, and either permit only one vote for each member or limit dividends on stock or membership capital to no more than 8 percent annually. (4)

Associations meeting the terms and conditions of the Capper-Volstead Act may have a common marketing agency. By means of such an agency, two or more eligible cooperatives may legally eliminate competition among them by having such an agency. It should be possible also to thus reduce marketing costs and expenses. Each of the associations that is a member of a common marketing agency must comply with all of the conditions of the Capper-Volstead Act. Such associations and a common marketing agency formed by them may not enter into abnormal transactions such as price fixing or other agreements with third persons which are contrary to the antitrust laws. If an association enters into such agreements or transactions which amount to a violation of the antitrust statutes, it is amenable thereto and the Department of Justice may proceed against it.

On the other hand, as an independent organization, an association meeting the terms of the Capper-Volstead Act, or a common marketing agency composed of such associations, has all the general rights, powers, and privileges that a businessman or ordinary business corporation possesses.

An association also has the rights and responsibilities of any state chartered business dealing in intra-state commerce. The anti-trust laws of the State would apply to a marketing association's sales within the State.



In citing the Capper-Volstead Act, we do not intend to suggest that independent producers cannot act together to market their products without forming a cooperative association. They may select a common selling agency to sell their fruit and not be restraining trade by this act.

#### A Role for Marketing Orders and Agreements

The fruit and vegetable industries have traditionally been confronted by imbalances between supply and demand. The farm sector has many firms, none of which are large enough to influence market price. In the marketing sector there are fewer firms who are ostensibly able to influence price or nonprice terms of trade. As a result of these and other factors, production and marketing are uncoordinated. Prices received by producers approximate minimum unit costs of production even on the most efficient farms. The structure of the market places individual producers in a weak market position compared to buyers. The producer becomes a price-taker; the buyer, the price-maker.

With this situation, the marketing order is viewed as a device to alter the economic outcome in favor of producers. Supply and demand is considered from an industry or aggregate viewpoint rather than from the viewpoint of a single producer. The marketing order agency is vested by government with authority to undertake specific activities to manipulate market supply or demand, or both.

Under the order, a producer retains his production autonomy but he loses independence to make certain marketing decisions. Handlers continue to interact directly with producers since the agency administering the order does not take title to the commodity. But to the extent that regulations

are imposed, handlers must operate under a different set of conditions than prior to the order.

The economic heart of a marketing order rests in three major types of activity:

1. Manipulation of the total supply of the commodity entering the market, and discrimination among markets in time, space, and form.
2. Regulation or alteration of trading practices.
3. Alteration of demand for the commodity through promotion.

The marketing order authority does not permit direct and open control of total production nor control of the entry of additional growers into production of a commodity. In developing the Agricultural Marketing Agreement Act of 1937, fruit and vegetable industry proponents of marketing orders believed production control was unnecessary or undesirable. They were most concerned with creating orderly marketing conditions, regulating quality, and prohibiting certain trade practices. Others believed, however, that production control was necessary to control surpluses. Production controls have been effected only in those orders which levied marketing allotments upon handlers.

Experience has shown that marketing orders are most effective under the following conditions:

1. A strong community of interests exists among participants. A basic similarity of technical and economic conditions among producers and among marketing firms is required. Wide variations among participating producers and firms in terms of size, production costs,

quality of the commodity producer, and methods of marketing are likely to be reflected in the administrative committee. This makes it difficult to secure effective implementation of terms in the order.

2. Informed, effective leadership prevails in the industry. The implementation and operation of many orders adjudged as being effective have been dependent upon the existence of informed, effective leadership among producers. Frequently, marketing cooperatives have assumed the role of leadership; occasionally an individual, or group of individuals, has performed the function. Such leadership need not be coercive or dictatorial. But orders are secured by producers, not imposed upon them. In the absence of individuals who are willing to assume responsibility for drafting the proposal, presenting it to producers, and supporting its passage, an order is unlikely to be initiated. Once established, the administrative committee and its staff must assume responsibility for development of appropriate information which will permit rational, informed operation of the order.
3. The structure of markets for the regulated commodity is such that effective enforcement of terms of the order is possible. Experience has shown that implementation and enforcement of an order is most efficient under those circumstances where the commodity is funneled through relatively few first-handler outlets. In this respect, processed commodities are well-adapted for effective implementation and enforcement of an order.

4. A high proportion of the relevant total supply of the commodity is under authority of the order. A State order regulating the marketing of a nationally produced commodity is not likely to be an effective instrument for improving producer prices and income, particularly if the order involves limitation of the quantity marketed. Producers outside the regulated area may respond to any initial supply-restricting, price-enhancing action by increasing their shipments. Even if national supply of the commodity is relatively fixed during the time of application of the state order, the short-run economic benefits generated by the order will be shared by all producers in a manner disproportionate to costs of the regulation. It is this type of limitation that has made voluntary regulation of supply impractical.
5. Appropriate demand relationships prevail for the commodity. If demand for a commodity, such as apples, is inelastic, (6) limiting supply will increase market price and producer income. This simple relationship may be difficult or impractical to apply, however, due to numerous markets, producer and consumer response over a period of time, substitute products, and inadequate information.
6. Producer supply response is relatively weak. The price and income benefits of the marketing order may be only temporary if the initial effect of the order increases price and producer returns above otherwise prevailing levels, and new producers start production or established producers increase production. Unless demand is increased at

rate at least proportional to the induced expansion in supply, price, and income will tend to decline to near the old level. As an alternative to expanding demand, larger and larger quantities of the commodity need to be taken off the market to maintain the enhanced price and total income. At some point, excessively large set-asides or diversions become intolerable, and the order collapses.

Since the producer can be expected to increase production in response to manipulated supply or demand, the question arises as to whether a marketing order is in the producer's long-run interest. Thus, the limitations of marketing orders must be perceived to avoid disappointment.

Marketing orders have helped solve certain economic problems. If the previous six conditions are largely fulfilled, along with judicious, intelligent application of a program, marketing orders have proven to be useful devices in dealing with the following marketing problems:

1. Short-term or seasonal surpluses. Under appropriate demand conditions, some orders have prevented producer prices from falling to abnormally low levels as a result of seasonal or periodic variations in total production. Marketing orders as now authorized may, however, actually be a hindrance to the adjustment which is needed to correct long-run price and income problems caused by excess production capacity in the industry.
2. Intraseasonal variation in supply and price. For those commodities which are storable, some orders have contributed to more uniform, systematic distribution of supply during the marketing season. In

so doing, they may have improved returns to producers for the for the season as a whole and assisted handlers in fulfilling retailer requirements for the commodity.

3. Quality control and uniformity. Soundly conceived regulations of grade, size, and other attributes of product quality may benefit producers, handlers, and consumers. Many marketing orders have contributed to the development of greater uniformity in quality attributes of fruits and vegetables. Sometimes, however, regulations of such attributes are a thinly disguised form of supply limitation.
4. Standardization of pack and containers. It is generally accepted that many marketing orders have increased marketing efficiency through regulations standardizing size, weight, and capacity of containers and the nature of fruit and vegetable packs.
5. Market and product development. Several orders have contributed to the developed new markets or expanded old ones. This contribution is particularly evident with respect to foreign markets. Some orders have sponsored research and undertaken development activities for new processed product forms.
6. Unfair trade practices. One of the greatest contributions of market-orders has probably been the establishment of uniform standards for grade, size, and maturity of shipped fruits and vegetables and for containers and pack. Third-party grading and inspection not only contributes to greater uniformity in the commodity and greater



facility in trading, but narrows the possibility of handlers' arbitrary exercise of market power to discriminate among producers.

## NOTES

- (1) The interested reader will gain further insight into developing a coordinated marketing program from the following publications available from Farmer Cooperative Service, USDA, Washington, D.C., 20250:

Coordinated Marketing Programs of Selected Fruit and Vegetable Cooperatives, Marketing Research Report No. 826, 1968

Fresh Fruit and Vegetable Marketing Organizations in Northeastern and Central States, General Report 84, 1960

Analysis of Returns and Practices of Florida Fresh Citrus Sales Organizations, Marketing Research Report 345, 1959

- (2) Basic concepts and detailed information on marketing can be found in The Report of the Royal Commission on the Tree-Fruit Industry of British Columbia, Dean E. D. MacPhee, 1958, 810 pages, available at some libraries and at the National Agricultural Library, USDA. Copies of selected legislation, regulations, and contracts are available from Farmer Cooperative Service or from the British Columbia Fruit Board, 1437 Water Street, Kelowna, British Columbia, Canada.
- (3) Pooling and Other Grower Payment Methods as Used by Local Fruit, Vegetable and Tree Nut Cooperatives, Clyde B. Markeson, FCS General Report 67, Dec. 1959.
- (4) Legal Phases of Farmer Cooperatives, Part III Antitrust Laws, Information 70, Farmer Cooperative Service, USDA, 1970
- (5) Taken from "Organization and Competition in the Fruit and Vegetable Industry," Part IV, Technical Study No. 4, National Commission of Food Marketing, June 1966.
- (6) Inelastic demand indicates that a percentage change in quantity marketed is associated with an opposite and larger percentage change in price.

## APPENDIX

### The British Columbia Centralized Selling System

Three major tree-fruit production areas in British Columbia are located at least 200 miles from major markets. In the early 1900's producers were faced with a surplus at harvest far beyond what markets could absorb. Buyers aggravated the situation by playing one grower against another in lowering prices or extracting rebates or claims. Two efforts at cooperative marketing between 1913 and 1925 failed for lack of grower patronage. Apparently, the 1922-25 period witnessed considerable cooperative investment in storage to achieve more orderly marketing. While prices improved by this action, non-participating growers moved their crop quickly, thus avoiding the investment and cooperative marketing costs. Demoralized co-op members followed suit and the orderly marketing efforts were abandoned.

These events led to several pieces of legislation between 1927 and 1960 and several court cases challenging the legality of various arrangements. Eventually, the legality of a single sales agency for all tree fruits produced in designated areas of British Columbia was firmly established. This sales agency, British Columbia Tree Fruits Limited (B.C. Tree Fruits) was incorporated in 1936 and operates as a non-profit, grower-controlled company. B.C. Tree Fruits receives its primary direction from the three-man British Columbia Fruit Board. Packer-shippers and B.C. Tree Fruits are tied together by contract. All packer-shippers must be licensed by the Board to operate. All fruit must be sold by B.C. Tree Fruits except grower sales to consumers, to roadside stands, and to retail stores in their own trading area.

The British Columbia Fruit Board was created by the British Columbia Natural Products Marketing Act. The British Columbia Fruit Growers Association handles the annual election of the three Board members. Board members must be growers.

B.C. Tree Fruits pools sales proceeds by variety, grade, and size of apples and crabapples under direction of a 6-member pooling committee. Four members of the committee are appointed by the British Columbia Fruit Growers Association, one by the Okanagan Federated Shippers Association, and one member is appointed by British Columbia Tree Fruits. Committee decisions are made by majority vote. The Chairman may break tie votes by casting a second vote.

The fruit growers' reasons for generally supporting centralized selling authorized by legislation are found in a public hearing statement made May 1, 1957, by Mr. Arthur Garrish, then President of British Columbia Fruit Growers' Association. The statement reads as follows:

"Orderly marketing, under effective marketing legislation, and through the medium of the central selling agency is the corner-stone of the association's broad, basic policy 'to do everything possible to protect and further the interests of the growers in all matters directly connected with the production and marketing of their fruit.'

"Orderly marketing means simply that all of the commodities produced by all of our members shall move to our markets, both near and far, in an orderly and planned manner to produce the greatest total returns possible under the marketing conditions existing during the period in

which the crop must be sold; and that the selling is controlled by one agency or board, with the sales proceeds pooled by commodities.

"It means that individuals, or groups of individuals, shall not be free to seek their own advantage at the expense of the group as a whole, by moving all their production to the most advantageous markets at the most favorable times.

"In the soft-fruit crop, it means that all producers share in the costs of advertising and promotion, and in the cost of maintaining service to cannery outlets through short crop years.

"In the apple-crop, which must be marketed over a period of eight or nine months, it means that in addition to sharing in the cost of advertising and promotion, all producers share in the cost of cold storage, in the risk of market fluctuations inherent in such a long marketing period, and in the risk of shrinkage from holding for later sale. -----

"It means the ability to maintain and expand distribution in distant and offshore markets, and to make firm commitments as to quantities, in negotiations with governments, where currency restrictions are involved.

"Markets must be supplied in an orderly fashion without alternate gluts and scarcities....Supplies not able to be immediately sold must be stored in expensive cold-storage plants until they can be disposed of as the markets will absorb them....To avoid advantages through pure chance to a particular grower's crop, because it is sold and shipped into an area where freight charges are small, or the sale is made earlier in the

season when prices may be better, or cold-storage costs at a minimum, crops of all growers are pooled as to variety, grade, and size.

"But it is not enough merely to have a substantial majority of growers cooperating for the benefit of all by pooling their products, consolidating their selling, avoiding glutted markets, planning and regulating distribution, and building expensive cold storage plants. These steps could merely provide an umbrella for the selfish minority of growers and shippers who were determined to sell quickly on markets, even though this might destroy the prices for everyone. This was well illustrated during the years in which the Associated Growers of British Columbia developed cold storages for the purpose of extending the time over which the marketing program could be spread. These cold storage plants were expensive. From selfish motives, an increasing percentage of the growers began to avoid their obligations in this regard, disposing of their crops quickly and thus avoiding the costs of shrinkage and storage.

"Without effective authority in the British Columbia Fruit Board over both provincial and interprovincial marketing of tree fruits, derived from Provincial and Federal Statutes, we believe that the orderly disposition of our product would cease, to be replaced by chaos with indiscriminate price cutting as the main feature of the situation where everyone was seeking to dispose of his holdings and to avoid sharing in the risks and costs involved in the overall program.

"While we agree that orderly marketing and central selling are not synonymous, we do contend that under our conditions, central selling and



pooling of the proceeds have given orderly marketing an effectiveness of efficiency that could not otherwise be achieved...To those who say that this operation of ours is an attempt to abolish the law of supply and demand, we would point out that in not one single market do we enjoy a monopoly of supply. We must at all times compete with supplies from other producing areas on the continent, and in the case of American soft-fruit production, we must do so with an absolute minimum of tariff protection. A manufacturing industry can adjust to this law by curtailing production and by stock-piling against more favorable market conditions. We can do neither, and once the trees are planted and in production, Nature controls almost completely the volume in any one given season, and the perishable nature of the product demands that it must be marketed or dumped within a relatively short time.

"In these circumstances, orderly marketing is not designed to interfere with the law of supply and demand. It is rather an attempt to live with it from season to season on reasonable terms...

"There may be those who, while agreeing with the advantages to be obtained from an orderly and planned disposal of the crop, will question the use of compulsion to obtain these ends...The industry has tried the alternative of voluntary cooperation and knows from bitter experience that it will not work. The whole history of our industry is filled with the struggle of our growers to bring about an orderly disposition of their produce on reasonable terms."

Objections to centralized selling expressed by a minority of British Columbia producers in 1957 included:

1. Objection to the principle of centralized selling
2. Voicing criticism, doubt, and suspicion about operations, while not objecting to centralized selling in principle
3. Desire for separate regional sales desks
4. Belief that the central sales desk reduces pressure on the sales organization.

In 1957, western Canada buyers generally agreed that central selling improved confidence as to price, delivery, and grades; and facilitated securing the variety and volume of fruit needed which individual packing-houses were too small to provide. Some buyers objected to the rigidity of day-to-day practices by the sales agency. One buyer preferred to trade and bargain and therefore bought fruit in the United States.





